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BOTANICAL SERIES

FIELD MUSEUM OF NATURAL HISTORY
FOUNDED BY MARSHALL FIELD, 1893

VOLUME XVI

THE GENUS BIDENS

PART I

BY

EARL EDWARD SHERFF
RESEARCH ASSOCIATE IN SYSTEMATIC BOTANY

B. E. DAHLGREN
CURATOR, DEPARTMENT OF BOTANY
EDITOR

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PREFACE

It is now a quarter of a century since the work detailed in the following pages was begun.[1] The genus *Bidens* was suggested at that time by Dr. Jesse More Greenman as deserving of monographic study (*cf.* my Revision of the Genus *Coreopsis*, Field Mus. Bot. Ser. 11: 279. 1936). Numerous facilities for research and publication were at once granted by the Department of Botany of the University of Chicago and by the Department of Botany of the Field Museum of Natural History. Subsequently, many other institutions of learning and many individuals throughout the world extended assistance of the most helpful kind. Indeed, it is certain that without their cooperation my studies could never have been advanced to a reasonable degree of completion.

The genus *Bidens* was so closely intertwined in botanical literature with *Coreopsis, Cosmos, Coreocarpus, Megalodonta, Dahlia, Isostigma, Heterosperma, Thelesperma,* and certain other genera of Compositae, that it became necessary in many cases to make a truly monographic study of these allied genera before attempting to progress further in the treatment of *Bidens* itself. This has occasioned considerable delay in the consummation of the present work but has permitted the writing of several other revisional texts which it is hoped will be of compensating value.

It is exceedingly difficult in a work of this kind to describe properly or to acknowledge completely the innumerable bits of aid received over so long a time as twenty-five years. Several botanists and collectors have personally journeyed to distant and often almost inaccessible places to secure specimens for my studies. Various teachers of botany have enlisted the aid of their more advanced students to secure a large assemblage of materials. Most of the world's larger museums and herbaria have lent their entire collections of *Bidens* and related genera or have placed at my disposal every desired facility when I sojourned with them for herbarium or library study. One foreign institution even went so far during the troublous times of the World War as to cut the sheets of type or other valuable specimens into halves and transmit one half for the delineation of my illustrative plates. In various articles already

[1] At the University of Chicago, where the first stages were completed in the graduate department. Some of the earliest findings were embodied in a paper (Studies in the genus *Bidens* III, Bot. Gaz. 61: 495. 1916) which was accepted by that institution as a thesis for the Doctor of Philosophy degree.

published, some of this assistance has been acknowledged. At this time, however, I would express my indebtedness and gratitude to the staffs of all the many cooperating institutions and especially to the following individuals: Dr. Charles Sprague Sargent (deceased), former Director, and Miss Ethelyn Tucker, Librarian, Arnold Arboretum of Harvard University; Dr. Adolph Engler (deceased), former Director, Dr. Ludwig Diels, present Director, Dr. Robert Pilger, Associate Director, and Dr. Johannes Mattfeld, Curator, Botanical Garden of Berlin; Dr. Herbert E. Gregory, former Director, Dr. Peter Buck, present Director, Mr. Charles Noyes Forbes (deceased), former Curator of Botany, Mr. Edwin H. Bryan, Jr., Curator of Collections, Dr. Harold St. John and Mr. Francis Raymond Fosberg, members of the Mangarevan Expedition of, Bernice Pauahi Bishop Museum; Dr. Robert Chodat (deceased), former Director, Institute of Botany of the University of Geneva and Boissier Herbarium; Dr. Alfred Barton Rendle, former Keeper of Botany, Dr. John Ramsbottom, present Keeper of Botany, and Mr. Spencer Le Marchant Moore (deceased; for many years affiliated with), British Museum of Natural History; Dr. Otto Buchtien, formerly in charge of the Buchtien Herbarium, La Paz, Bolivia; Dr. Emile DeWildeman, former Director, Dr. Walter Robyns, present Director, and Dr. P. Staner (until recently Attaché at the Museum of the Belgian Congo at Tervueren but now on the staff of), National Botanical Garden at Brussels; Dr. Harvey Monroe Hall (deceased), former Professor of Botany, and Dr. Willis Linn Jepson, Professor of Botany, University of California; Mr. James Melville Macoun (deceased), former Curator, Herbarium of Canadian Geological Survey; Dr. Otto Emery Jennings, Curator of Botany, Carnegie Museum, Pittsburgh; Dr. John Merle Coulter (deceased), former Head of Department of Botany, University of Chicago; Dr. Alexander Borza, Director, Institute for Systematic Botany at the University of Cluj; Dr. Carl Christensen, Curator of the Botanical Museum, University of Copenhagen; Dr. Willard Winfield Rowlee (deceased), former Professor of Botany, Dr. Liberty Hyde Bailey, former Professor of Horticulture, and Dr. Karl McKay Wiegand, Professor of Botany, Cornell University; Mr. Charles Clemon Deam, formerly owner and custodian of the Deam Herbarium; Mr. Otto Degener, author of the New Flora of the Hawaiian Islands, owner and custodian of the Degener Herbarium; Dr. Casimir DeCandolle (deceased), formerly in charge of the DeCandollean Prodromus Herbarium, Dr. John Isaac Briquet (deceased), former Director, and Dr. Benedict

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From its inception, most of the work has been done at the Field Museum of Natural History, where I have been shown innumerable courtesies and afforded much valuable aid. It is a genuine pleasure to express here my gratitude to Mr. Frederick J. V. Skiff (deceased), former Director, Mr. David C. Davies (deceased), former Director, Mr. Stephen C. Simms (deceased), late Director, Dr. Charles Frederick Millspaugh (deceased), former Curator of Botany, Dr. B. E. Dahlgren, present Curator of Botany, Mr. Paul

Carpenter Standley, Associate Curator of the Herbarium, and Mr. J. Francis Macbride, Assistant Curator of Taxonomy. I desire to thank also the Board of Trustees of Field Museum and particularly its President, Mr. Stanley Field.

From time to time since late in 1913, the results of my investigations in *Bidens* have been published in various botanical journals, especially the Botanical Gazette, the American Journal of Botany, the Journal of the Pan-Pacific Research Institution, the Occasional Papers of Bernice P. Bishop Museum, and the Bulletin du Jardin Botanique de L'État (Bruxelles). Numerous references to these journals will be found scattered through the present text. In fact, to a certain extent this text represents a final consolidation of the materials presented earlier in some two dozen or more separate articles. Most of the text stands as it was prepared ten or more years ago. A sincere attempt has been made, however, to add treatments for all new forms which have come to light recently and to incorporate, so far as space would permit, additional exsiccatae of importance and references to the more noteworthy recent literature.

Throughout the preparation of the original manuscript and final text, I have been aided in the proofreading by my wife, Fern R. Seeley Sherff. Her cooperation is acknowledged here most gratefully.

Of all the more important specimens cited I have made photographs, these aggregating probably more than two thousand. Complete sets are in my private collection and in the Herbarium of the Field Museum of Natural History. A few hundred photographs have been distributed to certain other herbaria, notably those of the Berlin Botanical Garden and the National Botanical Garden at Brussels.

It was originally intended to present delineations of authentic materials for every known species. Accordingly, until about six years ago I had sketched all species known to me, and even many varieties. Since that time, however, the pressure of other work, not to mention the anticipated limitations of space, has prevented the preparation of additional plates. Fortunately most of the recently described species are well represented in herbaria by type and cotype materials,[1] so that little difficulty should be encountered in problems of identification.

In general, geographic names are given essentially as in modern atlases. In a few cases, however, it has seemed wise to leave the

[1] The term "cotype" is used throughout to connote a *duplicate of the type* (i.e., a paratype; cf. J. C. Arthur et al., Bull. Torr. Bot. Club 34: 172–174, Apr., 1907).

country name as given in my earlier writings; e.g., British East Africa is retained for Kenya Colony and German East Africa for Tanganyika Territory.[1] In most cases where specimens were described as having been collected "in the vicinity of" a certain town or city, these qualifying words have been deleted by the Editor. Moreover, all altitudes expressed by the collector in feet have been altered in the process of editing to read in meters, the conversion being made on the slightly inexact basis of 3⅓ feet to one meter.

The text has been made to conform throughout to the International Rules of Nomenclature as adopted at Cambridge, England, in 1930 (ed. 3, Jena, 1935).[2]

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[1] An unwelcome complication arises in the latter case, in that northwesternmost German East Africa (that is, Urundi and Ruanda) now appears in atlases as a part of Belgian Congo. It is quite possible that several specimens recently collected in "Belgian Congo" came from territory cited by me for earlier specimens as a part of German East Africa.

[2] With the slight exception that Recommendation XL-b, intended to apply only to "a new specific or other epithet" and governing the construction of possessive names when these are derived from "the name of a man," is made to apply to *old* as well as "new" epithets. Thus, for examples, *Coreopsis Sereti* (original spelling) appears as *C. Seretii*, and *Bidens Eatoni* (original spelling) appears as *B. Eatonii*. It would seem that, in the interests of nomenclatural simplification and unification, a future International Congress should amend Recommendation XL, making part "b" and perhaps the other three parts to apply to old as well as to new epithets.

It may be added here that in the present text Recommendation XLIII of the International Rules has been followed in accordance with what it seemed must be a correct literal interpretation, rather than in accordance with the interpretation placed upon it by most botanists (if we may judge by their practice). This Recommendation provides that: "Specific (or other) epithets should be written with a small initial letter, except those which are derived from names of persons (substantives or adjectives) or are taken from generic names (substantives or adjectives)." This is essentially the same as Recommendation X of the International Rules adopted in 1905 at Vienna, and, curiously enough, the context contains the same flaws that were manifest in the context for the earlier recommendation. No example is given immediately of *a specific name taken from a generic name and used as an adjective* (in "*Lythrum Hyssopifolia*," perhaps originally intended for an example, "Hyssopifolia" is the name of a former genus and *is used as a substantive*, lacking, quite naturally of course, agreement in gender with *Lythrum*). However, elsewhere in the text of the 1930 Rules, specific epithets *taken directly from generic names and used as adjectives are begun with a small letter* (e.g., *linoides* from *Linum*, Art. 69, Examples, line 4). Confronted with this evident disregard of recommendations by those whose very duty it was to edit and publish them, I have chosen to ignore all but the literal wording of the recommendation itself as printed. In this way it is felt that the matured and officially expressed judgment of those in attendance when the recommendation in question was originally put to a vote has been given proper recognition. The reader will find, therefore, *Bidens Cosmoides*, *Bidens Cirsioides*, etc., in the text. Moreover, trivial names like *geraniifolia*, *ferulaefolia*, etc., have been construed as coming within the scope of the same recommendation, hence the names, *Bidens Geraniifolia*, *Bidens Ferulaefolia*, etc.

THE GENUS BIDENS

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HISTORICAL SURVEY OF GENUS

The genus *Bidens* dates back (if we disregard the genus in so far as it appeared in the works of Tournefort and other pre-Linnean writers) to Linnaeus' *Species Plantarum* (p. 831. 1753) and his *Genera Plantarum* (ed. 5. 362, No. 840. 1754). *Bidens tripartita* L. was the type. Except for certain species (e.g., *B. nivea* L., *B. verticillata* L., and *B. fruticosa* L.), which since have been universally recognized as belonging to genera other than *Bidens* (and, too, other than *Coreopsis;* see list of *Nomina e Bidente excludenda* at end of this work), the Linnean species of *Bidens* had achenial awns or aristae, and these were armed with retrorse barbs.

In 1790,[1] Necker (Elem. Bot. 1: 86–87) subdivided the genus *Bidens* into two new genera. Because of the existence of species with more than two achenial aristae, he dropped the name *Bidens.* He proposed, instead, the names *Pluridens* and *Edwarsia.* His *Pluridens* was described as having "folia simplicia" and apparently was meant as synonymous with *Bidens* L. sensu stricto (although the Linnean type of the genus *Bidens* was really *B. tripartita* L., a species with compound leaves!). It would include *Bidens cernua* L. His *Edwarsia* was described as having "folia composita" and consisting of "*quaed. Bident. Linn.*" It thus would include, for example, *B. pilosa* L. and *B. bipinnata* L.

In 1794, Moench (Meth. 569 and 595) followed Necker's treatment essentially, but substituted the names *Bidens* and *Kerneria* for Necker's two names. Neither Necker's treatment nor that of Moench is today accepted by botanists.

About a century ago Gaudichaud (Voy. Freycinet Bot. 464, *pl. 85.* 1826–1830), describing a species collected in the Hawaiian Islands during Freycinet's voyage, named the plant *Bidens micrantha.* Shortly afterward, Cassini (Dict. Sci. Nat. 51: 475. 1827) called attention to the curved achenes of Gaudichaud's species. He made this achenial character the basis for proposing his new genus *Campylotheca* (syn. *Dolicotheca*). Later, Lessing (Linnaea 6: 508. 1831)

[1] Cf. E. L. Greene, Pittonia 4: 245. 1901.

accepted Cassini's genus for species like *Bidens micrantha* Gaud., but erected a new genus, *Adenolepis*, to include a somewhat different form, his (Lessing's) *A. pulchella*. Concerning *Campylotheca*, however, we may note that the name was retained by DeCandolle in his *Prodromus* (5: 593. 1836), although elsewhere it was accorded only slight attention. In fact, the collections in those days embraced so few specimens from the Pacific Islands that little study was made of the Pacific flora by taxonomists.

DeCandolle (loc. cit.) listed under *Bidens* proper 76 species. An essential character of *Bidens* as distinguished from *Coreopsis* was, in his opinion, the possession of retrorse barbs by the achenial aristae. If these were lacking he referred the species to *Coreopsis*. His 76 species of *Bidens* he divided into three sections. His Sect. I, *Platycarpaea*, included such species (as to obovate-cuneiform, obcompressed, or flat achenes) as *B. tripartita* L., *B. connata* Muhl., and *B. cernua* L. His Sect. II, *Psilocarpaea*, included such species (as to elongate, linear-tetragonal achenes) as *B. triplinervia* H.B.K. and *B. pilosa* L.; and with these species he even joined those climbing species like *B. Rubifolia* H.B.K. and *B. squarrosa* H.B.K., species which have elongate, flat, almost ribbon-shaped achenes. His Sect. III, *Discopoda*, included the one species *B. purpurea* DC., a species that was a true *Cosmos* and later was very properly transferred to that genus (Benth. & Hook. Gen. Pl. 2: 387. 1876; cf. Hemsl. Biol. Centr. Amer. Bot. 2: 200. 1881). It is seen, then, that the true species of *Bidens* were in reality divided by DeCandolle into only two sections, namely, *Platycarpaea* and *Psilocarpaea*. These, however, were distinguished upon a surer morphological basis than was the case with either Necker or Moench.

Aside from *Campylotheca* and *Bidens*, DeCandolle (op. cit. 633) described a new plant that resembled *Bidens*, but which appeared remarkable in having the ligules pistillate and fertile. He created the genus *Delucia* therefor, and his new plant he named *D. Ostruthioides* (later Schultz Bipontinus in Seem. Bot. Voy. Herald 308. 1852–1857 renamed the species *Bidens Ostruthioides*, and this latter name has been widely accepted ever since). Nuttall, in 1841 (Trans. Amer. Phil. Soc. n. ser. 7: 368), reduced *Campylotheca* to the rank of a section under *Bidens*, but did not give extended reasons for so doing. His attention had been directed to the subject by his having traveled among the Hawaiian Islands and discovered there at least one new species of *Bidens* (his *B. gracilis*). Nuttall, however, did evince a rejection of Cassini's main character for *Campylotheca*,

namely, the curved or twisted achenes. He worded his description to read "sometimes curved or contorted," and for one species (his *B. mutica*) he definitely described the achenes as "straight." Since Nuttall's time, we may add, many other closely affiliated species have been discovered, including forms of *Bidens micrantha* itself, which have straight achenes, thus bringing the curved-achene character into discredit.

In 1856 Schultz Bipontinus undertook the determination of various specimens collected on the Island of Nukahiva (Marquesas Islands) by Edward Jardin. Finding four new species native to this single small island, Schultz Bipontinus appears to have entered upon a very careful and painstaking research into the subject of their generic affinities, finally publishing his results[1] in *Flora* (39: 357. 1856). As regards the maintenance of a genus *Campylotheca* apart from *Bidens*, he was unreservedly against such a course. His four new species from Nukahiva and all of the Hawaiian species he referred to *Bidens*.

In 1861, Asa Gray (Proc. Amer. Acad. 5: 125–128) made the next important contribution to a knowledge of the group. Gray had received from the Museum of Natural History in Paris several specimens collected by Jules Remy in the Hawaiian Islands, also a number from the United States Exploring Expedition under Captain Wilkes, collected in the Hawaiian Islands, Tahiti, Eimeo, and elsewhere in the Pacific. Most of these were new species. Gray's publication indicates that he was probably unaware of Schultz Bipontinus' paper. Thus, for example, he inadvertently created the name *Coreopsis Macraei* for a plant already named by the latter *Bidens Campylotheca*. As, therefore, he does not seem to have read Schultz Bipontinus' paper, it is all the more interesting and valuable to find that Gray, too, was compelled to abandon the name *Campylotheca*. Species having the achenes wingless and the awns retrorsely barbed he described under *Bidens*. But several other species, different in having either exaristate achenes or even winged achenes, he described under *Coreopsis*. Thus he described *Bidens hawaiensis*, *B. Lantanoides*, *Coreopsis mauiensis*, *C. macrocarpa*, *C. Macraei*, *C. Cosmoides*, and *C. Menziesii*. Gray's own words at the time of describing some of these species are worthy of note. Speaking of the futility of maintaining *Campylotheca* as a separate

[1] For a personal estimate, apparently unbiased and accurate, of the taxonomic ability and sagacity that Schultz Bipontinus displayed at times, see Bentham, Journ. Linn. Soc. 13: 340. 1873.

genus, apart from *Bidens* and *Coreopsis*, he said: "Its adoption merely gives us three limitless genera unmarked by any peculiarity in habit, in the place of two artificially separated ones. . . . Vain is the attempt to draw absolute limits where Nature luxuriates in gradations" (Proc. Amer. Acad. 5: 126. 1861).

In 1888 there appeared the posthumous *Flora of the Hawaiian Islands* by William Hillebrand. From his twenty years of resident study in the Hawaiian Islands and his careful investigations subsequently, Hillebrand was eminently well versed in their species. His treatment assumes almost the aspect of a monographic revision, and it is evident that he possessed much more than an ordinary knowledge of *Bidens* and related groups. His brilliancy, however, appears to have been manifested, as is so apt to occur with a local botanist, less in the excellence of his genus concept than in that of his species concept. And, even in the latter respect, his generalizations are often necessarily faulty because of the inadequacy of his material. Hillebrand, like Gray, appears never to have seen Schultz Bipontinus' paper. He discarded Gray's treatment, however, and adopted once again Cassini's name *Campylotheca*. Speaking of *Campylotheca* he says (p. 211): "The genus, as it presents itself now, stands evidently nearer to *Bidens* than to *Coreopsis*, and might be merged in the former if it were not for the winged achenes of so many species,[1] which, if admitted in the character of *Bidens*, would efface the limits between that genus and *Coreopsis*." Gray's Hawaiian *Bidens* is transferred by Hillebrand to *Campylotheca*.[2]

From early times down to and including the work of Drake del Castillo, botanists, as exemplified by Augustin DeCandolle (the DeCandolle who is meant throughout this work except where noted to the contrary) and Asa Gray, tended to refer to *Bidens* those species with retrorsely barbed awns, and to *Coreopsis* those species with antrorsely barbed awns or with awns inconspicuous.[3] But, from time to time in North America, new forms have been discovered, identical in each case with a certain species of *Coreopsis* (as then

[1] Regarding the inaccuracy of this statement, cf. footnote 1, p. 24.

[2] We may note at this point that shortly following Hillebrand's book, Drake del Castillo (Illustr. Fl. Ins. Mar. Pacif. 208–210. 1890) transferred all the *Campylotheca* species, also several allied species of *Bidens*, to the genus *Coreopsis!* Strangely, however, he left such species as *Bidens Lantanoides* Gray and *B. australis* Spreng. (*B. paniculata* Hook. & Arn.) in *Bidens*.

[3] It is true that in isolated cases species with retrorsely barbed achenes were put by Jacquin (e.g., *Bidens Ferulaefolia*), by Loureiro (e.g., *B. leucorrhiza*), by Cavanilles (e.g., *B. Sambucifolia*), and by others into *Coreopsis*. In each such case, however, these species were sooner or later transferred to *Bidens* and there retained by the great body of taxonomic workers.

delimited) or *Bidens* except in the direction of the barbs on the awns. Asa Gray (cf. Fernald, Rhodora 15: 77. 1913), when confronted with such a form of "*Coreopsis aristosa* Michx." (the then accepted name), designated it "*C. aristosa in Bidentem transformata.*" Later (Syn. Fl. N. Amer. 1, pt. 2: 294–296. 1884) he treated this and similar forms as hybrids between *Coreopsis* and *Bidens*.

In 1893, Britton (Bull. Torr. Bot. Club 20: 280–281), emphasizing the instability of the barb-direction character for *Bidens frondosa* L., and also separating the two genera on general grounds rather than by one particular character, transferred six species from *Coreopsis* to *Bidens*. The validity of these transfers has since been accepted unhesitatingly by all prominent American botanists who have critically studied the Eastern United States species of *Bidens*, among them Wiegand (Bull. Torr. Bot. Club 26: 401. 1899), Greene (e.g., Leafl. Bot. Crit. 1: 200. 1906),[1] and Robinson and Fernald (Gray's Man. ed. 7: 839. 1908). It is also implied by many other botanists working upon the species of other regions but following the same distinctions, a singular case being that of Brandegee's description (Zoë 5: 239. 1906) of *Bidens alpina* and Greenman's description (Proc. Amer. Acad. 41: 264. 1905) of *Bidens sarmentosa*. The achenes are described for *B. alpina* as "nearly smooth; awns none or two varying from 1 mm. long to rudiments, corneous and not barbellate"; for *B. sarmentosa*, as "glabrous or sparingly hispidulous, awnless or with reduced awns." But, on investigation, these species were found to be identical; in turn, *B. sarmentosa*, which from priority of publication would otherwise stand as the accepted species, was found to match in every character *Coreopsis Anthemoides* DC., having achenes described (DC. Prodr. 5: 573. 1836) as "(immaturis) linearibus glabris brevissime bidentatis." Thus, a species placed by DeCandolle in *Coreopsis*, evidently because of its very short awns, was independently referred by Brandegee and by Greenman, about 70 years later, to *Bidens*, evidently because the achenes lacked wings and the general characters coincided closely with those of certain unquestioned species of *Bidens* (e.g., *B. triplinervia*, especially its var. *macrantha*, with awns retrorsely barbed). More recently still, specimens of this same species have been found with most of the achenial aristae retrorsely barbed, and one such form has been described as *Bidens Purpusorum* Bitt. & Ptsn. (cf. Sherff, Bot. Gaz. 76: 153. 1923).

[1] Thus, Greene refers to *Bidens* a plant ("*B. tenuissima*") with "erect, *upwardly barbed awns.*"

Fernald, in a recent discussion of the awn characters of *Bidens* (Rhodora 15: 74–78. 1913), lists no fewer than six American species in which occurs a more or less pronounced form having the awns barbed in the reverse from the normal direction. Thus, for example, *Bidens connata* Muhl. has awns retrorsely barbed, while var. *anomala* Farw. has awns antrorsely barbed. Again, *Bidens aristosa* (Michx.) Britt. has antrorsely barbed awns, while the var. *Fritcheyi* Fern. has retrorsely barbed awns. Hence it is obvious that, were the old artificial method of distinguishing between *Coreopsis* and *Bidens* (namely, by the direction of the barbs on the awns) to be retained, an anomalous situation would result. We should be compelled either to regard each of these varieties as a hybrid between two species of distinct genera, a course certainly unwarranted in several cases (cf. Fernald, loc. cit., and Wiegand, Bull. Torr. Bot. Club 26: 401. 1899), or to refer each variety to the other genus, an entirely indefensible alternative. We are compelled, then, to view these varieties, in at least the majority of cases, as merely more or less distinct and pronounced forms of their respective species. This being true, the awn character method of separating *Coreopsis* from *Bidens* is seen to demand a restatement. In the light of my own monographic researches upon these two genera, we may go only so far as to say that all forms with retrorsely barbed achenial aristae belong in *Bidens*, but that forms having antrorsely barbed aristae or having no aristae at all may belong in either *Bidens* or *Coreopsis*, depending upon various other considerations.[1]

The somewhat superficial study made by Greene (Pittonia 4: 242–270. 1901) upon several species of *Bidens* may be noted here in passing. Greene commented upon the dissimilarity between such species as *B. cernua* L. and *B. tripartita* L. Even so radical a botanist as he, however, refrained from proposing a generic segregation of the *B. cernua* forms. Nevertheless, Greene did segregate the aquatic *Bidens Beckii* as the type of a new genus, *Megalodonta;* and, when the peculiar achenes of this species are considered, it seems wise to accept Greene's new genus as valid.

Strangely enough, no one appears to have tried to segregate generically the pronounced and well defined group of *Bidens* species typified by *B. reptans* (L.) G. Don.[2] These species differ from the

[1] For additional notes on the aristal barbs, see Wegener, Beih. Bot. Centralbl. 31: 79. 1914; etiam Briquet, Arch. Sc. Phys. Nat. 42: 65. 1916.

[2] DeCandolle (Prodr. 5: 599. 1836), however, did create the name *Bidens Coreopsidis* for one of these species. Even earlier, the names *Coreopsis reptans* L., *C. incisa* Ker., etc., had been given to certain of these species, but without very serious consideration's being given to their generic affiliations.

more typical species in being climbers, and in having long, flat achenes that are hispid along the two edges in such a way at times as to suggest a centipede. They are referred in this work to the Section *Greenmania*.—Similarly, the anomalous *Bidens clarendonensis* Britton may be mentioned here. It has trailing, somewhat woody stems, thick, rhombic-ovate leaves, and by some might be interpreted as representing a new genus (although by me it is taken as representing the monotypic section *Neurophyllum*).

It is seen that, if we accept the narrow concept of *Bidens* held by Cassini, Lessing, and Hillebrand, and seek to segregate the native Pacific species under the name *Campylotheca*, to be consistent we shall have to subject the entire genus *Bidens* to a process of subdivision and segregation, resulting in at least eight genera. There are at least two good reasons for not adopting such a course. In the first place, the accuracy of such a series of interpretations is not so well established as to justify overturning almost the entire nomenclature of the genus. In the second place, the lines of demarcation among the various subordinate groups are so fluctuating and inconstant that efforts to apply a binomial system of nomenclature to the many species would be rendered even more difficult than before. I am constrained to reject, therefore, any idea of seriously interfering with the general status of *Bidens*. Cassini's name *Campylotheca* I am compelled to reject.[1]

[1] In taking this step it is reassuring to read the words of so eminent a student of the Compositae as Bentham. Speaking of Cassini and his work, he stated (Journ. Linn. Soc. 13: 338. 1873): "Unfortunately, however, in working out the details of the genera in the 'Dictionaire,' he indulged in an enormous and useless multiplication of generic names, which only tended to throw the nomenclature into confusion, and cast a slur upon all his labors. Wherever he observed a slight difference in the involucre, pappus, or general aspect, or could not readily identify an imperfect specimen, an engraved figure, or a description often incorrect, he at once set it down as a new genus, and has thus, more than any other botanist of equal ability, overloaded the science with useless synonyms. So recklessly, indeed, did he give way to this mania of coining new names, that he on many occasions proposed two, or even three, for the same genus, leaving future botanists to take their choice." Cassini did not neglect *Campylotheca* in this respect. At the very outset he proposed *Dolicotheca* as an alternative name. This latter name, however, was never adopted by Lessing, DeCandolle, or others.

We may note here that recently Brown (Forest B.H., Fl. S.E. Polynesia 3: 350. 1935; Bishop Mus. Bull. 130: 350. 1935) has retained *Campylotheca* and advanced various queries as to the presence or importance of certain diagnostic characters hitherto relied upon or hitherto neglected. On the other hand, Degener (in numerous names published conjointly with myself in past articles cited in the following pages), Grant (in such names as *Bidens orofenensis*, *B. glandulifera*, *B. aoraiensis*, etc., published or repeated in this volume with his cooperation), J. W. Moore (Bish. Mus. Bull. 102: 46. 1933), St. John (in many herbarium determinations), Skottsberg (Medd. Göteborgs Bot. Trädgård 10: 191. 1935), and various other able students of the Pacific floras have inclined toward outright reduction of *Campylotheca* to *Bidens*.

Having laid aside the name *Campylotheca*, we must note next the lack of absolute uniformity in even one distinctive character among the numerous species of *Bidens* and of the allied genus *Coreopsis*. In spite of this lack, however, one such character does persist to a considerable extent, especially among the African and North American (as contrasted with the South American) species. It is the presence (in *Coreopsis*) or absence (in *Bidens*) of two lateral wings upon the mature achene. *In cases where other criteria are absent*, it appears to offer the only logical basis of distinction. This presence or absence of achene wings was given great weight by Gray, but in the Pacific flora the wing character is unreliable, and will lead, if absence of wings be demanded from all species of *Bidens*, to an arbitrary and unnatural arrangement. Some three or four Hawaiian forms commonly have accessory awns or barbs below the achene's apex, and either these or the principal awns frequently are decurrent along the achenial edges as a more or less thickened margin or even as a wing; or at times the awns seem unrelated to the wings. In *Bidens mauiensis*, these wings are very conspicuous. The number of Hawaiian species that exhibit this character, however, is very small compared with the remaining Pacific species that lack it.[1] Moreover, a study of their other characters, such as odor of bruised foliage (when fresh) and shape of ligules, as well as range of distribution, shows them to be much closer to the wingless-achened *Bidens* species of the Pacific than to the American species *Coreopsis lanceolata* L., which has winged achenes and which must be taken as the type of the genus *Coreopsis*. It seems wise, therefore, to treat such species as belonging in *Bidens* instead of in *Coreopsis*, where placed by Asa Gray. We shall have even then no greater incongruity in *Bidens* than must perforce be tolerated in *Coreopsis*. Thus, for example, all authors who have dealt with the subject have retained the North American wingless-achened *Coreopsis rosea* Nutt. and *C. tinctoria* Nutt. in *Coreopsis* despite their anomalous achenes, because their other characters clearly indicated a closer affinity with *Coreopsis* than with *Bidens*. Manifestly this was the only correct course to pursue, and my own procedure is precisely comparable.

On reference to recent descriptions and types of African species of *Bidens*, we find that in several cases the awns, even on achenes of the same head, are barbed both antrorsely and retrorsely. Thus,

[1] Cf. Hillebrand's misleading words, "the winged achenes of so many species." Doubtless Hillebrand was recalling many specimens of a few species, and unguardedly referring to them as "so many species." Reference to his individual descriptions shows few of the species to be described as wing-achened.

for example, Moore (Journ. Linn. Soc. Bot. 37: 322. 1906) created the name *Bidens ambigua* for *Gossweiler* 1189, for the very reason that some of the awns are smooth, others antrorsely barbed, and others retrorsely barbed ("achaeniis . . . . aristis 2 quam se ipsa brevioribus dentibus perpaucis nunc erectis nunc recurvis onustis vel etiam omnino calvis . . . ., hence the trivial name"). Yet in the same year (Journ. Bot. 44: 22. 1906) he likewise somewhat arbitrarily created the name *Coreopsis Taylori* for a plant showing the same variation (coll. *W. E. Taylor*, Jan. 5, 1886; "achaeniis . . . . apice setuloso-ciliatis calvis vel aristulis 1 vel 2 brevissimis erecto- vel patenti- vel etiam recurvo-uncinulatis onustis saepe vero nudis . . . .; indeed, the plant might almost as well be considered a *Bidens*, but the habit is that of *Coreopsis*"). In referring the latter species to *Coreopsis*, he relied mainly upon its habital similarity to other (so-called) species of *Coreopsis* from Africa. But, as will be seen presently, some of these species belong in reality to *Bidens*. Therefore, this habital similarity, affording formerly an apparently good reason for the name *Coreopsis Taylori*, can no longer be given much consideration.

The present writer, in bringing together the numerous species of *Bidens* for monographic treatment, has come to adopt fully the distinctions between these two genera as followed by recent American botanists. In brief, the genus *Coreopsis* is maintained primarily because of the peculiar habit and winged achenes of the Linnean type species (excluding *C. alba*, *C. Bidens*, and *C. alternifolia*, Sp. Plant. ed. 1. 907–909. 1753; cf. Britton, Bull. Torr. Bot. Club 20: 280. 1893).

Similarly, the genus *Bidens* is maintained primarily because of the peculiar habit, strongly barbed awns, and wingless achenes of several of the Linnean species of *Bidens*.

MORPHOLOGY, HISTOLOGY, CYTOLOGY, ECOLOGY, AND OTHER SPECIAL LINES OF INQUIRY

No attempt can be made here to survey completely the work done so far upon *Bidens* in the several special fields of plant research.[1]

[1] Aside from references to Frank's finding of connecting bundles in *Bidens* (Bot. Zeit. 1864: 154 and 382. 1864; cf. DeBary, Comp. Anat. Phan. Ferns 308. 1884) and to Hanstein's finding of transverse girdles in *B. cernua* and *B. tripartita* (Abh. Berl. Acad. 1857: 77. 1857; cf. DeBary, op. cit. 297), my manuscript includes little of value connected with the morphology or histology of the stem or branches.

The morphology of the chaff scales and involucral bracts of the European species of *Bidens* has been studied by Briquet (Arch. Sc. Phys. Nat. 43: 333. 1917). A summary of his findings, as presented elsewhere (Briq. & Cavill. Fl. Alp. Marit.

Nor can an attempt be made to summarize the environmental conditions under which the numerous species live. These are so varied, ranging from almost extreme hydrophytism[1] to almost extreme xerophytism, that habitat data can best be and are presented in association with the *Specimens examined*.[2] There, too, will be found special notes on any uses for medicines, dyestuffs, beverages, etc., that various collectors have recorded. There is practically no literature upon the cytology or genetics of *Bidens*.[3]

6: 215. 1917), is quoted verbatim: "Enfin, une autre particularité très intéressante de nos espèces du genre *Bidens* consiste dans le fait que les bractées involucrales internes et externes ont une structure très différente. Indépendamment de nombreux caractères distinctifs de détail, les canaux sécréteurs sont liés aux faisceaux dans les premières (dans la nervure médiane, il y a 2 canaux phléotermiques et un canal sur la face ventrale de l'endoxyle), dans les secondes les canaux sont beaucoup plus volumineux et placés dans le mésophylle en dehors des faisceaux. Les bractées paléales présentent les principaux caractères des bractées involucrales internes, mais avec une forme différente et une réduction dans le nombre des faisceaux et des canaux."

The alternation of calyx projections (achenial aristae), corolla lobes, and stamens in the abnormally tetramerous disc florets of *B. cernua* has been noted by Buchenau, also by Wydler (see p. 302, footnote 1).

The achenes' internal structure was investigated for various Compositae by Hanausek (Ber. Deutsch. Bot. Gesellsch. 20: 449. 1902; Sitzungsber. Königl. Acad. Wiss. Wien, Math.-Naturw. Kl. 116: (Abt. 1) 3. 1907; Wiesner-Festschrift 139. 1908; Denkschrift Königl. Akad. Wiss. Wien, Math.-Naturw. Kl. 87: 93–142, *pls. 1–3*. 1912). For *Bidens bipinnata, B. tripartita, B. abyssinica*, etc., as for certain other Compositae (e.g., *Helianthus annuus*), he found the pericarp to have a "coal-depositing" layer. This and related facts are summarized by Briquet and Cavillier (Fl. Alp. Marit. 6: 214. 1917), who state as follows: "La section transversale de l'akène des *Bidens* est rhomboïdale; l'épicarpe n'est pas cristallifère et ne porte point de trichomes autres que les aculéoles; sous l'épicarpe se trouve un hypoderme à éléments ± étirés radialement en palisades, hypoderme simple par places, plus souvent multiple, dont les parois internes (en contact avec le sclérocarpe) transforment leur lamelle mitoyenne (mitoyenne avec le sclérocarpe) *en un épais dépôt de charbon* (ligne d'un noir fuligineux continue en coupe transversale entre l'hypoderme et le sclérocarpe); le sclérocarpe forme une cuirasse continue, épaisse de 2–3 assises, à stéréides externes pourvues d'aspérités en brochette faisant saillie dans le dépôt de charbon; les faisceaux sont encastrés dans la région interne du sclérocarpe, leur xylème étant enveloppé par le leptocarpe parenchymateux; l'endocarpe ne présente rien de particular; l'albumen possède des parois cellulaires souvent ± colorées en violet; le plan de symétrie de l'embryon coïncide avec le plan de symétrie de la fleur: les cotylédons sont transversaux."

[1] The truly aquatic *Bidens Beckii* Torr. is here excluded from the genus, in accordance with the treatment of E. L. Greene, who renamed it *Megalodonta Beckii* (Pittonia 4: 271. 1901).

[2] We may note in passing, however, a cultural experiment by H. B. Guppy (Studies in Seeds and Fruits 445–446. 1912) upon *Bidens cernua* and *B. tripartita*, "two species that grow in wet stations by the sides of ditches, ponds, and rivers. After three generations the height of the plants was reduced from 17 or 18 inches to 5 or 6 inches, the fleshy stems becoming dry, woody, and wiry, the length of the achenes being reduced by half." In young plants of *B. cernua*, Guppy was able (op. cit. 480–482), by withholding water, to produce an approach in leaf outline to that of *B. tripartita*.

[3] Lawrence, writing on "The genetics and cytology of *Dahlia* species" (Journ. Genetics 21: 125–159. 1929), cites (p. 151) his own root tip count for the somatic number of chromosomes in *Bidens atrosanguinea* "as approximately 48, which was

Certain studies have been made, however, upon the flowering and fruiting heads, having to do chiefly with protection and pollination, which studies may be mentioned here:

Protection of pollen.—Hansgirg (Pflanzenbiolog. Untersuch. 122–123. 1904) lists five types of antipluvial (*"regenscheuer"*) flowers, the protection of whose pollen rests upon a phytodynamic principle. As illustrating his third type, characterized by a standing upright of the flowers or heads in pleasant weather and by their drooping over (due to a flexure of the axis) in rainy weather, he mentions, among other genera, *Bidens*. (See also *B. Volkensii*, next paragraph.)

Insect visits.—Robertson (Trans. Acad. Sci. St. Louis 6: 473–474. 1894) made a study of insect visits to plants of *B. aristosa* on fourteen days, Aug. 2 to Sept. 15, in the neighborhood of Carlinville, Illinois. He presents lists of Hymenoptera, Diptera, Lepidoptera, Coleoptera, and Hemiptera which he observed. On Sept. 20 he studied the insect visits, in the same neighborhood, to *"B. chrysanthemoides* Michx." (as this species does not grow in Illinois he clearly meant *B. cernua*). There he found represented all the above groups but Hemiptera.—Scott Elliot (Ann. Bot. 5: 357. 1891), in his notes on the fertilization of South African and Madagascar flowering plants, recorded a visitation of *B. pilosa* by *Pieres hellica.*—Knuth (Bot. Centralbl. 49: 301. 1892) reported the visit at Kiel, Germany, of *Lucilia cornicina* to *B. cernua.* He later (Blutenbiol. 2, pt. 1: 598–599. 1898) recorded also the visit of *Bombus terrester* to the same species, and cited as well a visit by the honey bee which had been recorded by H. Müller. For *B. tripartita*, Knuth reported MacLeod's observation of the bees *Bombus* and *Anthrena* visiting the flowers; he recorded also his own observation of three hoverflies and one bug.—William Saunders, of London, Ontario, reported insect captures (Canad. Entomologist 11: 196. 1879; also, Amer. Entomologist 1880: 75. 1880) by a species of *Bidens*, in all probability *B. cernua.* "The insects which he had observed thus captured were Dipterous [flowerflies, of the genus *Syrphus*], all of whom had been

later confirmed by a pollen mother cell count of 24. Considerable irregularity of the divisions was apparent and multiple association was also marked." He records his unsuccessful attempt to cross *B. atrosanguinea* with *Dahlia Merckii.* We must observe, however, that *B. atrosanguinea* is a true *Cosmos* and thus can not represent *Bidens.*

The same writer wrote elsewhere (in lit., October 21, 1931): "It is a remarkable fact but, with the exception of *Bidens atrosanguinea*, not a single species of *Bidens* or *Coreopsis* has been examined cytologically as far as I am aware.... I have little doubt that these genera are mainly polyploid. One would expect to find multiple series of chromosomes as in *Chrysanthemum* and *Senecio*, but of course I have no evidence for this view."

caught by the mouth; some were found dead, others still living, but unable to withdraw their proboscis."—On the other hand, Meehan (Proc. Acad. Nat. Sci. Phila. 1891: 271. 1891) recorded his invariable failure, throughout two years of repeated observations, to find one instance of insect visitation for *B. frondosa*. He advanced the opinion that the long, retrorsely barbed achenial aristae had exerted a deterrent influence on the insects. He furthermore ventured the assertion that *B. frondosa* has in no way suffered "by ages of pure in-and-in breeding."—Hansgirg, in the work already cited (p. 133), lists various myrmecophobic plants. He includes *B. Volkensii* along with the common dandelion, *Taraxacum palustre* var. *vulgare* (Lam.) Fern. (*T. officinale* Weber), as having reflexed outer involucral bracts, this tending to prevent access of ants to the flowers.

Protection of flowering heads when young.—Gressner (Flora 69: 94. 1886) investigated the developing involucre for two species of Compositae. He states for *B. tripartita* (as translated): "The edge of the bracts of the involucre of the very young inflorescence possesses no indentation—but, instead, at fairly regular distances apart, several-celled trichomes. These have stiff, strongly cuticularized walls and are bent hook-like. . . . The outer surface of the cell wall shines forth through the delicate strip of cuticle, beautifully ornamented. Through the inter-hooking of these marginal trichomes there is obtained an exact enclosure of the bud. Later, as it seems, the hair-structure in question is broken asunder; the bracts of the matured involucre are twisted in an extremely irregular way, and a mass of many-shaped, several-celled trichomes surrounds the disrupted bract apex."

Anthers and style at anthesis.—Cassini (Opuscul. Phytolog. 1: 31. 1826) and, much later, Friedrich Hildebrand (Geschlechtsverhältnisse Compos. 66. 1869) described and illustrated the surface of the style branches for *B. tripartita*. To translate from Hildebrand: "The extreme apex [of each style branch] possesses a fascicle or tuft of sweeping-hairs and somewhat deeper down, separated by a smooth flat surface from the upper hair-cluster, still a second sweeping-hair region occurs."—Knuth (Blum. Insekt. Nordfrieschen Inseln 88. 1894; Blütenbiol. 2, pt. 1: 598. 1898) described the behavior of *B. tripartita* at and following anthesis rather minutely. To translate: "Ray flowers almost constantly lacking.[1] Cross section

[1] Here we may note Thuillier's surprising and erroneous statement (Fl. Par. ed. 1. 232. 1790), that there occur sometimes one or two imperfect florets "à la circonférence de la feuille." In his second edition (p. 422. 1799) he corrected "feuille" to read "fleur."

of the head at most 1 cm. The sweeping-teeth at the apex of the style are somewhat long, those following thereafter are shorter, the lowermost the longest. They sweep the pollen forward out of the anther cylinder, whereupon the latter withdraws entirely into the corolla tube. Then the stigma branches unfold their papillose inner surface, while meantime the heretofore widely spread corolla lobes become again somewhat erect and the backwardly barbed calyx teeth spread away from each other, so that the cross section of the head above becomes finally 2.5 cm. The originally yellow flowers become colored toward the end of the blooming-period an unsightly brown."—In his Blütenbiologie (p. 599), Knuth treated also of *B. cernua*, citing H. Müller for various details. To translate: "About a hundred flowers compose a head. Each disk flower possesses, according to H. Müller, an approximately 1.5 mm. long tube and an almost equally long, 1 mm. wide bell or limb. Out of this there arises at the first of the flowering period the anther tube, covered with pollen and about 1 mm. thick; in the later part of the flowering period, moreover, the 1 mm. long style branches spread apart. The structure of these accords quite well with that of the foregoing *B. tripartita*. The stigma papillae are so broad that light pollen grains of the same flower remain fast upon the edge, so that here, as also with the foregoing species, spontaneous self-pollination is made possible."—We may note also that Meehan (Proc. Acad. Nat. Sci. Phila. 1893: 303. 1893) meanwhile had made a study of anthesis in *B. bipinnata* and reported it to be essentially the same as for *Heliopsis laevis:* "The style pushes up the staminal tube, starting at nightfall. During the next day the pollen is pressed through the divisions of the incurved staminal appendages, the style branches protrude the following nightfall, the staminal tube retires the next day, followed the following day by the retreating style."[1]

Genus **BIDENS**: Descriptio[2]

Linn. Sp. Pl. 831. 1753 (maxima ex parte); Gen. Pl. ed. 5. No. 840. 1754.

Plantae (familiae Compositarum) herbaceae vel fruticosae, annuae vel perennes, erectae vel procumbentes vel etiam scandentes, glabrae vel pilosae; caulibus teretibus vel angulatis, plerumque striatis.

[1] Under the title "Beiträge zur Entwickelungsgeschichte des Pistills" Buchenau (Linnaea 25: 622–633. 1852) gives a detailed account of pistil development in the related *Coreopsis bicolor* Bosse (verisimiliter *C. tinctoria* Nutt.).

[2] Regarding the gender of the word *Bidens*, I quote from Briquet and Cavillier Fl. Alp. Marit. 6: 215, footnote 1. 1917: "Linné Sp. ed. 1, p. 831 (1753) a introduit dans la nomenclature botanique moderne un nom générique *féminin*. Independam-

Folia principalia opposita vel rarissime ternata, integra vel dentata vel incisa vel semel bis terve ternatim pinnatimve dissecta; superiora interdum alterna. Capitula nunc mediocria vel majuscula ad apices ramorum vel in dichotomiis solitaria, nunc minora numerosiora irregulariter corymboso-paniculata; nunc heterogama, radiata, floribus radii 1-seriatis neutris vel rarius pistillatis, disci hermaphroditis fertilibusque, nunc radio deficiente homogama. Involucrum saepius campanulatum vel subhemisphaericum, bracteis plerumque 2 (rarius 3–4) -serialibus, basi saepe breviter (rarissime dimidio) connatis, exterioribus saepius herbaceis nunc brevibus nunc in folia elongata (raro etiam decomposita) expansis, interioribus plerumque membranaceis saepius hyalino- vel flavido-marginatis. Flores ligulati plerumque albidi flavive rarius rubri, lamina patente integra vel saepius denticulata. Paleae angustae, subplanae, flores hermaphroditos subtendentes. Flores disci corolla regulares, tubulosi, limbo cylindraceo urceolatove raro 4- plerumque 5-fido. Antherae basi integrae vel auriculis parvis muticis sagittatae. Styli floris hermaphroditi rami superne hirti, appendicibus brevibus acutis vel longioribus subulatis superati. Achaenia a dorso compressa vel 3–4-gona, obovato-oblonga vel cuneata vel plus minusve linearia, glabra vel pilis brevibus (his e tuberculis interdum ortis) sursum vel rarius retrorsum spectantibus ciliata vel conspersa, marginaliter rarissime tuberculato- vel submembranaceo-alata, apicaliter aequalia vel attenuata nec distincte vel raro rostrata, nunc exaristata nunc ad vel sub apice ipso aristis 1–8 rigidis plerumque persistentibus plus minusve (antrorsum retrorsumve) barbellatis vel aculeolatis rarissime ad glandulas parvas reductis munita.

SECTIONES GENERIS

No fewer than fourteen sections may be recognized.[1] These are:

Sect. I. **Campylotheca** (Cass.) Nutt. Trans. Amer. Phil. Soc. ser. II. 7: 368. 1841 (pro genere, Cass. in Dict. Sci. Nat. 51: 475. 1827). *Adenolepis* Less. Linnaea 6: 510. 1831 (pro genere).

ment du fait que les noms de genre peuvent être arbitraires (*Régles nomencl.* art. 24), les termes *bidens*, tridens, etc., étaient employés en latin non seulement comme substantifs masculins, mais aussi comme adjectifs: *Bidens* (sous-entendu *Herba*) *tripartita* est donc correct, même au point de veu du purisme, qui N'est pas le nôtre. Les expressions *Bidens tripartitus, cernuus*, etc., doivent être rejetées."

[1] Sect. *Discopoda* DC. (Prodr. 5: 604. 1836)=*Cosmos*, sect. *Discopoda* (DC.) Sherff, Field Mus. Bot. 8: 430. 1932.

Sect. *Hydrocarpaea* A. Gray (Syn. Fl. N. Amer. 1, II: 298. 1884)=*Megalodonta* Greene, Pittonia 4: 271. 1901.

Sect. *Adenolepis* (Less.) O. Hoffm. in Engler & Prantl (Pflanzenf. 4, v: 245. 1894)=sect. *Campylotheca* (q.v.).

Adenolepis (Less.) O. Hoffm. in Engler & Prantl, Pflanzenf. 4, V: 245. 1894 (pro sect. *Bidentis*).—Nos. 1–59.

Demum plerumque fruticosae, saepissime glaberrimae, suci odore carotae plus minusve similes. Capitula saepius numerosa, radiata. Achaenia recta vel torta, saepius biaristata aristis plerumque retrorsum hamosis. Plantae insularum Oceani Pacifici. (Type, *B. micrantha.*)

Sect. II. **Degeneria** Sherff, Bot. Gaz. 93: 213. 1932.—No. 60.[1]

Genitalia praesertim stylo longissimo valde exserta. (Type, *B. Cosmoides.*)

Sect. III. **Neurophyllum** Sherff, op. cit. 214.—No. 61.

Herbae perennes, procumbentes, foliis crassioribus, perspicue nervatis. (Type, *B. clarendonensis.*)

Sect. IV. **Clomtonia** Sherff, loc. cit.—No. 62.[2]

Frutices, foliis oblongis, acuminatis, etc. Cum characteribus typi. (Type, *B. monticola.*)

Sect. V. **Greenmania** Sherff, op. cit. 88: 297. 1929.—Nos. 63–73.

Herbae Americae tropicae perennes, plerumque scandentes, caulibus saepe 5–10 m. longis; capitulis numerosis, normaliter radiatis; achaeniis elongatis, valde obcompressis vel omnino planis, lateribus parallelis et saepissime valde setosis, apice plerumque biaristatis aristis saepius longis nunc retrorsum hamosis nunc calvis. (Type, *B. Rubifolia.*)

Sect. VI. **Selvorngea** Sherff, op. cit. 93: 214. 1932.—No. 74.[3]

Herbae perennes, glabrae; foliis sessilibus, decussatis, rigidis, oblanceolato-oblongis, serratis, etc. Cum characteribus typi. (Type, *B. graveolens.*)

Sect. VII. **Fulsotsia** Sherff, loc. cit.—No. 75.[4]

Caulis glaber fere nudus, foliis 3–4-jugis, parvis, sessilibus, integris, linearibus. Cum characteribus typi. (Type, *B. fistulosa.*)

Sect. VIII. **Heterodonta** (Nutt.) Sherff, loc. cit. Pro sect.? *Diodontae* Nutt. Trans. Amer. Phil. Soc. ser. II. 7: 361. 1841. Sect.

[1] Named for Mr. Otto Degener, the well-known authority on the flora of the Hawaiian Islands.

[2] Name anagrammatic for *monticola.*

[3] Name anagrammatic for *graveolens.*

[4] Name anagrammatic for *fistulosa.*

Hederodonta Nutt. ex Walp. (generis *Diatontae* Nutt. ex Walp.) Repert. 2: 615. 1843.—Nos. 76 and 77.

Plantae boreali-americanae, foliis plerumque simplicibus, capitulis discoideis vel subradiatis et cylindricis vel ellipsoidalibus, achaeniis planis lineari-cuneatis. (Type, *B. Bidentoides.*)

Sect. IX. **Meduseae** (Nutt.) Sherff, loc. cit. Pro sect. *Diodontae* Nutt. Trans. Amer. Phil. Soc. ser. II. 7: 360. 1841. *Diodonta* Nutt. (sed syn. *Coreopsis aurea* Ait. et *Diodonta Bidentoides* Nutt. excludenda sunt) loc. cit. Pro sect. *Diatontae* Nutt. ex Walp. Repert. 2: 615. 1843. *Diatonta* Nutt. ex Walp. (exclud. syn. *Coreopsidem auream* Ait.), op. cit. 614. *Diadonta* Nutt. ex Walp. op. cit. 6: 164. 1846. Pro subsect. sectionis *Eucoreopsidis* Pfeiffer, Nom. Bot. 1: 1085. 1874 (non vere Torr. & Gray).—Nos. 78–82.

Plantae boreali-americanae; foliis plerumque pinnatis raro indivisis vel bipinnatis; capitulis radiatis luteis; achaeniis planis nunc lineari-cuneatis nunc cuneato-obovatis saepe crasso-marginatis et plus minusve tuberculatis, exaristatis vel biaristatis aristis saepius antrorsum hamosis. (Type, *B. polylepis.*)

Sect. X. **Platycarpaea** DC. Prodr. 5: 594. 1836.—Nos. 83–94.

Folia plerumque simplicia vel pinnatim 3–7-partita (raro 2–3-pinnatisecta); achaeniis ovalibus vel obovato-cuneiformibus, obcompresso-planis vel apicem versus tetragonis. (Type, or at least first cited species, *B. tripartita.*)

Sect. XI. **Psilocarpaea** DC. Prodr. 5: 596. 1836.—Nos. 95–218.

Plantae habitu valde diversae, nunc annuae nunc perennes, herbae vel frutices; foliis simplicibus vel (etiam valde) decompositis; capitulis discoideis vel radiatis, nunc minimis nunc maximis; achaeniis plerumque plus minusve linearibus, planis vel tetragonis, apice muticis vel aristatis.—A large section, containing more than half of the species in the genus. Future studies may indicate the advisability of splitting this section into several smaller groups. (Type species not indicated by DeCandolle. *B. fruticosa* (Vest) DC., cited first by DeCandolle, unknown both to him and to me. *B. decolorata* H.B.K., the next species cited, reduces to *B. aurea*, which species may therefore serve as the section type.)

Sect. XII. **Steppia** (Schz. Bip. in Walp.) Sherff, op. cit. 215. Pro sect. *Coreopsidis*, Schz. Bip. in Walp. Repert. 6: 163. 1846.—Nos. 219–231.

Folia dentibus apicaliter setigeris saepius dentata; floribus tubulosis ad medium saepius tumido-articulatis vel anulatis; achaeniis plerumque biaristatis aristis antrorsum hispidis. (Type, *B. chaetodonta.*)

Sect. XIII. **Lesperthema** Sherff, op. cit. 216.—No. 232.[1]

Involucri bracteae interiores basaliter vel etiam usque ad medium connatae. Achaenia exteriora marginibus perspicue incrassata. (Type, *B. phelloptera.*)

Sect. XIV. **Ebussa** Sherff, loc. cit.—No. 233.[2]

Involucri bracteae interiores basaliter vel etiam usque ad medium connatae. Achaenia praecocia, clavato-linearia, exalata, apice plus minusve incrassato-capitata vel crassiusculo-anulata. (Type, *B. praecox.*)

CLAVIS

a. Plantae insulis Oceani Pacifici centralis nativae.[3]

b. Folia plerumque indivisa.

c. Inflorescentia monocephalica pedunculataque.

d. Folia tomentoso-pubescentia.....11. *B. Lantanoides.*

d. Folia glabra.

e. Petioli laminas aequantes superantesve.

f. Achaenia alata.

56. *B. mauiensis* var. *cuneatoides* et var. *Forbesiana.*

f. Achaenia exalata.....57. *B. molokaiensis.*

e. Petioli laminis breviores.

f. Folia basi late cuneata, utroque latere 3–5 dentibus grosse dentata.

g. Folia membranacea, saepius 2–3 cm. lata, dentibus in unico latere saepe usque ad 12; achaeniis costis marginibusque dense setosis apice biaristatis.

59. *B. Saint-Johniana.*

[1] Name anagrammatic for that of *Thelesperma*, which genus is strongly suggested by the interior bracts, these being connate below (as are also those in Sect. XIV).

[2] Name anagrammatic in honor of Dr. Walter Busse, collector of the type, the name *Bussea* having already been used (pro genere) by Harms (Bot. Jahrb. 33: 159. 1902) in another connection.

[3] Introduced species, being readily distinguishable from the indigenous ones, are here omitted. The introduced species commonly found in certain localities, especially in the Hawaiian Islands, are: *Bidens laevis, B. pilosa, B. biternata, B. Cynapiifolia,* and *B. tripartita* (the last apparently absent in the Hawaiian group). The central Pacific region, as here taken, extends from the Tropic of Cancer southward to slightly past the Tropic of Capricorn (Maretiri or Bass Isls.) and from about 127° to 180° W. Long.

g. Folia crassiuscula, 1–2 cm. lata, dentibus in unico latere plerumque 3–5; achaeniis marginibus sparsissime ciliatis apice exaristatis.....58. *B. cuneata.*

f. Folia basi rotundata vel cordata, utroque latere 6–15 dentibus serrata.....57. *B. molokaiensis.*

c. Inflorescentia capitulorum paucorum multorumve, cymosa vel paniculato-corymbosa.

d. Capitula ad anthesin minuta, tantum 2–4 mm. alta.

e. Achaenia 6–8 mm. longa; speciebus insularum sandvicensium.....22. *B. Degeneri.*

e. Achaenia plerumque 2.5–6 mm. longa; speciebus hemisphaerii australis.

f. Folia plus minusve oblongo-ovata, breviter acuminata, petiolis crassiusculis 1.2–1.4 mm. latis..1. *B. Ahnnei.*

f. Folia lanceolata vel oblongo-lanceolata vel lanceolato-ovata, caudato-acuminata, petiolis tenuibus 0.6–0.8 mm. latis.

g. Achaenia plerumque lineari-fusiformia, corpore 2–3 mm. longa et 0.7 rarius usque ad 1 mm. lata, calva vel brevissime 1- vel 2-aristata aristis adrecte hispidulis et usque ad 0.3 mm. longis; planta ex insulis Marquesas.....2. *B. polycephala.*

g. Achaenia lineari-oblonga, corpore 3.5–5 mm. longa et 1.25 mm. lata, biaristata aristis retrorsum hamosis 0.5–1 mm. longis; planta ex insula Raiatea.
3. *B. deltoidea.*

f. Folia angustiora, plerumque anguste lanceolata vel oblongo-lanceolata.....13. *B. australis.*

d. Capitula ad anthesin majora.

e. Folia plerumque anguste lanceolata vel anguste oblongo-lanceolata.

f. Plantae marquesianae.

g. Achaeniorum corpora circ. 4 mm. longa.
4. *B. Jardinii.*

g. Achaeniorum corpora circ. 6 mm. longa.
5. *B. Bipontina.*

f. Plantae nec marquesianae nec sandvicenses.

g. Capitula pauca (±8 in unico ramo).

h. Folia tenuiter petiolata; involucri bracteis exterioribus 3–6 mm. longis, patentibus reflexisve; achaeniis dense erecto-hispidis. . 15. *B. Mathewsii.*

h. Folia alato-petiolata; involucri bracteis exterioribus 8–12 mm. longis, adpressis; achaeniis porriginosis. 19. *B. orofenensis.*

g. Capitula numerosiora.

h. Folia unico latere 20–40 (raro –75) -dentata; capitulis 6–7.5 mm. latis et 3–4 mm. altis; involucri bracteis exterioribus circ. 1 mm. longis interioribus circ. 2 mm. longis; floribus ligulatis 2–3 mm. longis. 13. *B. australis.*

h. Folia unico latere 6–17-dentata; capitulis 15 mm. latis et 6 mm. altis; involucri bracteis exterioribus circ. 3 mm. longis interioribus circ. 3.5 mm. longis; floribus ligulatis circ. 8 mm. longis. 12. *B. mooreensis.*

f. Plantae sandvicenses; achaeniorum corporibus 8–11.5 mm. longis.

g. Involucri bracteae exteriores 1–2 mm. longae; capitulis numerosis; multis foliis divisis; floribus ligulatis plerumque 3–5.

h. Capitula distantia, planta lanaiensi. 21. *B. distans.*

h. Capitula congesta, planta molokaiensi. 52. *B. micrantha* var. *caduca.*

g. Involucri bracteae exteriores 2–5 mm. longae; capitulis vix numerosis; foliis plerumque indivisis; floribus ligulatis 7–8.

h. Achaeniorum aristae sub corporis apice positae. 20. *B. hawaiensis.*

h. Achaeniorum aristae ex apice ipso ortae. 35. *B. Skottsbergii* var. *conglutinata.*

e. Folia latiora.

f. Folia subtus pubescentia.

g. Folia utrinque pubescentia. . . . . 7. *B. Beckiana.*

g. Folia supra sparsim pubescentia vel demum subglabrata. . . . . 8. *B. cordifolia.*

f. Folia plus minus ve glabra (hic stant etiam formae depressae sarmentosae humiles simplicifoliae *Bidentis graciloidis*).

g. Caules ramive plus minusve glauci; plantis sandvicensibus.

h. Involucri bracteae exteriores 1–2.5 mm. longae.

i. Folia simplicia ovata vel rhomboideo-ovata. 26. *B. ctenophylla.*

i. Folia simplicia oblongo-lanceolata.

j. Achaeniorum aristae sub corporis apice positae. 20. *B. hawaiensis.*

j. Achaeniorum aristae ex apice ipso ortae. 35. *B. Skottsbergii* var. *conglutinata.*

h. Involucri bracteae exteriores circ. 4–5 mm. longae. 23. *B. asymmetrica.*

g. Caules ramive interdum pallidi (*B. Populifolia*) sed non glauci.

h. Folia plus minusve ovato-lanceolata vel ovata, basaliter cuneata vel rotundata raro vix subcordata, petiolis 0.5–3 cm. longis; plantis non sandvicensibus.

i. Capitula ad anthesin 3.3–4 cm. lata; foliis acriter serrata.....17. *B. Henryi.*

i. Capitula angustiora.

j. Folia leviter vel obsolete serrulata vel subintegra.

k. Achaenia alata, 2.3–3 mm. lata. 9. *B. hivoana.*

k. Achaenia exalata, circ. 1 mm. lata. 10. *B. hendersonensis* et var. *oenoensis.*

j. Folia acriter serrata.

k. Folia crassiuscula; planta e Tahiti. 18. *B. glabrata.*

k. Folia membranacea.

l. Achaenia exalata.

m. Achaenia corpore 5–10 mm. longa.

n. Achaenia exaristata, corpore 9–10 mm. longa; involucri bracteis exterioribus perspicue spathulatis quam interioribus longioribus; planta ex insula Raiatea....14. *B. raiateensis.*

n. Achaenia biaristata, corpore 5–8 mm. longa; involucri bracteis exterioribus oblongo-linearibus quam interioribus paulo brevioribus; planta ex insula Pitcairn ..... 15. *B. Mathewsii.*

m. Achaenia corpore 2.5–4.5 mm. longa.

n. Achaenia plerumque biaristata, corpore 3.8–4.5 mm. longa; planta ex insula Tahiti .... 16. *B. aoraiensis.*

n. Achaenia vix vel non aristata, corpore circ. 2.5 mm. longa; planta ex insula Hiva Oa ..... 6. *B. collina.*

l. Achaenia crassiusculo-marginata vel -alata, marginibus apice in aristas productis. 27. *B. glandulifera.*

h. Folia si simplicia ovata, basi subcordata vel cordata; petiolis usque ad 6 vel etiam ad 10 cm. longis.

i. Planta ex insulis marquesianis; foliis subtus secundum rachidis basim caespitose hispidis. 33. *B. uapensis.*

i. Plantae ex insula Oahu; foliis glabris.

j. Folia obtuse dentata; achaeniis anguste linearibus, exalatis, corpore 7–12 mm. longis. 34. *B. Populifolia.*

j. Folia acriter dentata; achaeniis late linearibus, saepe alatis, corpore 1.2–2 cm. longis. 28. *B. macrocarpa* var. *ovatifolia.*

h. Folia si simplicia oblongo-ovata, basi late cuneata; petiolis circ. 1–3 cm. longis; planta ex insula Hawaii ..... 35. *B. Skottsbergii.*

b. Folia plerumque divisa.

c. Capitula magna, ad anthesin 5 cm. lata; stylis 6–10 mm. antheras superantibus, ramis abrupte longo-caudatis. 60. *B. Cosmoides.*

c. Capitula minora, plerumque solis stylorum ramis supra antheras projectis.

d. Folia bipinnatim divisa, segmentis ultimis angustis (vel in *B. waianensi* interdum lata).

e. Plantae decumbentes vel adscendentes.

f. Capitula solitaria vel longe pedunculata.
56. *B. mauiensis* var. *lanaiensis.*

f. Capitula corymbosa vel paniculata.
55. *B. Hillebrandiana.*

e. Plantae erectae.

f. Pedicellae pedunculique minimi dense et insigniter albido-pubescentes.....26. *B. ctenophylla.*

f. Pedicellae vel pedunculi glabri.

g. Achaenia spiraliter volubilia vel torta; foliorum segmentis late linearibus vel latioribus.
54. *B. waianensis.*

g. Achaenia recta vel paululum torta, corpore 8–13 mm. longa, foliorum segmentis linearibus vel filiformibus, vel raro latioribus ac dentibus elongatis angustis perspicue dentatis.
53. *B. Menziesii* et var. *filiformis* et var. *leptodonta.*

g. Achaenia recta vel subrecta, corpore 6–9 mm. longa; foliorum principalium segmentis rhomboideo-ovatis vel cuneate lineari-lanceolatis, dentibus non elongatis.
37. *B. sandvicensis* var. *typica* f. *compositior.*

g. Achaenia recta vel subrecta, corpore circ. 3–7.5 mm. longa.

h. Achaenia corpore 6–7.5 mm. longa. 36. *B. obtusiloba.*

h. Achaenia corpore circ. 3 mm. longa.
32. *B. pulchella.*

d. Folia ternatim vel pinnatim divisa, vel interdum imperfecte bipinnata.

e. Plantae decumbentes vel adscendentes.

f. Capitula solitaria vel longe pedunculata.
56. *B. mauiensis* etiam var. *cuneatoides* et var. *media.*

f. Capitula cymosa, corymbosa, vel paniculata.

g. Paleae usque ad 1 cm. longae, achaenia matura biaristata superantes.....55. *B. Hillebrandiana.*

g. Paleae multo breviores atque achaeniis plerumque exaristatis multo superatae.

h. Capitula pansa ad anthesin 1.1–1.5 cm. lata.
25. *B. graciloides.*

h. Capitula pansa ad anthesin 6–8 mm. lata.
22. *B. Degeneri* var. *Apioides* et f. *filicifolia.*

e. Plantae erectae.

f. Achaeniorum aristae principales plerumque infra corporis apicem ortae et corporis marginibus continuae, vel deficientes.

g. Achaenia valde torta.....54. *B. waianensis.*

g. Achaenia recta vel paulum curvata.

h. Achaenia angusta (0.5–1.7 mm. lata), atra, exalata vel rarius subalata; capitulis ad anthesin 4–6 mm. alta et 1.5–2 cm. lata.

i. Capitula numerosa, saepe dense corymbosa vel paniculata; achaeniis maturis plerumque ad facies et margines glabris.

j. Ligulae apice saepe profundissime incisae; achaeniis inferne plerumque 1–3-setosis, setis elongatis erectis partim adnatis.
26. *B. ctenophylla.*

j. Ligulae non vel tantum moderate dentatae; setis basalibus elongatis partim adnatis utroque margini achaeniorum deficientibus.

k. Achaenia matura perspicue ac intense nigra; involucri bracteis exterioribus tantum circ. 1.5 mm. longis.....52. *B. micrantha* et var. *kaalana* et var. *laciniata.*

k. Achaenia matura atra vel parce nigra sed non intense perspicueque nigra.

l. Involucri bracteae exteriores tantum 1–2 mm. longae.

m. Ligulae elliptico-oblongae, aegre denticulatae, 1.5–3 mm. latae; achaeniis glabris.

n. Capitula distantia, planta lanaiensi.
21. *B. distans.*

n. Capitula congesta, planta molokaiensi.
52. *B. micrantha* var. *caduca.*

m. Ligulae cuneato-obovatae, dentatae vel lobulatae, 3–5 mm. latae; achaeniis basim versus lateraliter erecto-setosis.
40. *B. fecunda.*

l. Involucri bracteae exteriores plerumque 2.3–5 mm. longae.

m. Foliola non nisi inferiora petiolulata. 38. *B. conjuncta.*

m. Foliola normaliter tenui-petiolulata. 40. *B. fecunda.*

i. Capitula pauciora, cymoso-corymbosa vel hac atque illac sparsa; achaeniis maturis atris ac non nitidis, ad margines setosis. 51. *B. waimeana.*

h. Achaenia matura saepe latiora, subbrunnea vel brunneo-nigra, saepe alata; capitulis ad anthesin 7–15 mm. altis et 2–3 cm. latis.

i. Capitula ad anthesin 7–8 mm. alta et circ. 3 cm. lata; involucri bracteis subaequalibus circ. 6 mm. longis; floribus ligulatis 1–1.6 cm. longis; floribus tubulosis 15–20. . . . 28. *B. macrocarpa.*

i. Capitula ad anthesin 8–15 mm. alta et circ. 2 vel vix 2.5 cm. lata; involucri bracteis exterioribus minoribus plerumque 1.5–3 mm. longis; floribus ligulatis 6–9 mm. longis; floribus tubulosis 30–45. 29. *B. magnidisca.*

f. Achaeniorum aristae deficientes vel principales plerumque ex apice ipso ortae.

g. Involucri immaturi bracteae exteriores reflexae; involucro interiore perspicuo et ei *Cosmidis bipinnati* Cav. simili. . . . . 50. *B. amplectens.*

g. Involucri immaturi bracteae exteriores erectae vel patentes.

h. Capitula plerumque solitaria, pedunculis usque ad 11 cm. longis, bracteis exterioribus valde foliaceis. 48. *B. valida.*

h. Capitula ac bracteae exteriores diversae.

i. Achaenia spiraliter volubilia vel valde torta.

j. Achaenia plerumque per 3–5 revolutiones voluta. 44. *B. torta.*

j. Achaenia plerumque per 0.6–2 revolutiones voluta.

k. Folia caulina 3–5-partita.

l. Capitula numerosa, parva, ad anthesin 3.5–6 mm. alta et circ. 0.9–1.5 (rarius –2) cm. lata.

m. Foliola saepius ovato-lanceolata vel late oblongo-lanceolata, apice saepius subobtusa vel tantum breviter acuminata.

n. Foliola juvenia plerumque pilis numerosis fulvescentibus vel etiam ferrugineis obsita; achaeniis 0.6–0.8 mm. latis, exaristatis.

45. *B. fulvescens.*

n. Foliola primo glaberrima; achaeniis 1–1.7 mm. latis, biaristata aristis tenuibus ± 1 mm. longis.

23. *B. asymmetrica.*

m. Foliola lanceolata breviter vel longe acuminata, primo viridia.

n. Folia (petiolis inclusis) principalia 5–13 cm. longa.....39. *B. Wiebkei.*

n. Folia (petiolis inclusis) principalia 1–2.5 dm. longa.....43. *B. Forbesii.*

l. Capitula pauca, ad anthesin majora, 6–12 mm. alta et ± 2 cm. lata; foliis principalibus (petiolis inclusis) 1–2.5 dm. longis.

m. Achaenia apice calva vel irregulariter 1–2-aristata aristis usque ad circ. 1.3 mm. longis.....46. *B. Campylotheca.*

m. Achaenia biaristata aristis longis (4 mm.), filiformibus, deciduis.

47. *B. nematocera.*

k. Folia caulina plerumque 5–7-partita.

l. Foliorum caulinorum foliola inferiora saepe alternata; achaeniis anguste linearibus, apicem versus anguste elongatis.

24. *B. cervicata.*

l. Foliorum caulinorum foliola inferiora plerumque opposita; achaeniis superne tantum paulum angustatis.

m. Internodia longa; foliis paucis et magnis; capitulis paucis, pansis ad anthesin 3–4 cm. latis.
46. *B. Campylotheca* var. *pentamera.*

m. Internodia brevia; foliis plerumque subnumerosis, magnitudinis mediae; capitulis plerumque numerosissimis, unico specimine in herbario 50–200 ferente, his pansis ad anthesin tantum circ. 1.5–2 cm. latis.....54. *B. waianensis.*

i. Achaenia recta, curvata, vel tantum paulum torta.

j. Inflorescentiae rami late patentes, 1–pauci-capitulati; internodiis caulis ac ramorum plerumque longis.
46. *B. Campylotheca* et var. *pentamera.*

j. Habitus diversus.

k. Folia principalia plerumque 3-partita.

l. Foliola anguste lanceolata, crenato-serrata, terminali apice longo-attenuato; capitulis non numerosis.....31. *B. Asplenioides.*

l. Foliola lanceolata vel ovata (et non elongatiora nisi cum capitulis numerosis), acute serrata, terminale apicaliter acutum vel acuminatum sed non longo-attenuatum.

m. Capitula ad anthesin minuta, 6–8 mm. lata et 4–5 mm. alta.
22. *B. Degeneri* var. *Apioides.*

m. Capitula ad anthesin majora.

n. Caulis (basi excepta) et rami acute tetragoni, superne herbacei.

o. Foliola lateralia plerumque sessilia; achaenii corpore 10–16.5 mm. longo.

p. Involucri bracteae exteriores 1.5–2 (raro –2.5) mm. longae; achaeniis circ. 0.7–0.8 mm. latis, exaristatis.....45. *B. fulvescens.*

p. Involucri bracteae exteriores 2–7 (plerumque 4–6) mm. longae; achaeniis circ. 1 mm. latis, plerumque aristatis. 38. *B. conjuncta.*

o. Foliola petiolulata; capitulis numerosissimis; achaenii corpore 10–12.5 mm. longo.....40. *B. fecunda.*

o. Foliorum majorum principalium foliola lateralia petiolulata; achaenii corpore 6–10 mm. longo.

p. Capitula demum in herbarii speciminibus siccis dense adgregata ac plerumque inter se tangentia, aequaliter vel subaequaliter edita.....41. *B. coartata.*

p. Capitula demum in herbarii speciminibus siccis sparsa, rariter inter se tangentia, nec in eodem nec fere eodem aequo stantia. 37. *B. sandvicensis.*

n. Caulis et rami rotundato-tetragoni, superne vix herbacei.

o. Achaenia matura plus minusve torta.

p. Achaeniorum aristae deficientes vel usque ad 1 mm. longae. 23. *B. asymmetrica.*

p. Achaeniorum aristae elongatae et inaequaliter flexuosae usque ad 4 mm. longae. 47. *B. nematocera.*

o. Achaenia matura recta vel curvata, non torta.

p. Involucri bracteae exteriores plerumque fere vel interdum plene interioribus aequales. 51. *B. waimeana.*

p. Involucri bracteae exteriores quam interiores tertio vel dimidio breviores. 25. *B. graciloides.*

k. Folia principalia saepius 5-partita.

l. Capitula 2–5-adgregata, ramis tenuibus longis erectis nudis gesta, separatim pedunculata pedunculis plurime 2–5.5 cm. longis; ad anthesin 7–8 mm. alta. 49. *B. Stokesii.*

l. Capitula cymoso-corymbosa vel paniculata, pedunculis vel pedicellis plurime brevioribus; ad anthesin plerumque 4.5–7 mm. alta.

m. Achaenia plerumque glabra, vel superne sparsim setosa.

n. Foliola anguste lanceolata, crenato-serrata, terminale apicaliter longo-attenuatum; herba ex insula Niihau (insularum Sandvicensium). 31. *B. Asplenioides.*

n. Foliola moderate vel late linearia.

o. Pedicellae pedunculique glabri. 42. *B. Salicoides.*

o. Pedicellae pedunculique albido-pubescentes....26. *B. ctenophylla.*

n. Foliola lanceolata vel ovata, acute serrata, terminale apicaliter acutum acuminatumve sed non longo-attenuatum.....37. *B. sandvicensis.*

m. Achaenia marginibus moderate vel copiose setosa.

n. Plantae plerumque 2–5 dm. altae.

o. Inflorescentia manifeste supra folia exserta.....30. *B. micranthoides.*

o. Inflorescentia (totius plantae et non solius rami) non manifeste supra folia exserta....25. *B. graciloides.*

n. Plantae plerumque 4–9 dm. altae.

o. Capitula pansa ad anthesin 2.6–3.1 cm. lata; achaeniis perspicue aristatis (aristis circ. 4 mm. longis). 47. *B. nematocera.*

o. Capitula pansa ad anthesin usque ad 1.5 cm. lata; achaeniorum aristis deficientibus vel usque ad circ. 1 mm. longis.

p. Habitu *B. asymmetricae* adpropinquans; foliis pinnatis, foliolis ovato-lanceolatis, foliolo terminali folii majoris omnino circ. 6–16-dentato. . 51. *B. waimeana.*

p. Habitu *B. sandvicensi* adpropinquans.

q. Folia pinnata, foliolis ovatis vel lanceolatis vel saepius ovato-lanceolatis, foliolo terminali folii majoris omnino circ. 22–26-dentato.
37. *B. sandvicensis* var. *setosa.*

q. Foliola inferiora saepius rursus partita, alia plerumque linearia, foliolo terminali folii majoris omnino circ. 2–8-dentato. . . 37. *B. sandvicensis* var. *imminuta.*

a. Plantae in America boreali centralique etiam in insulis Occidentali-Indicis crescentes.

b. Herbae vel frutices perennes, scandentes, achaeniis linearibus biaristatis plus minusve planis longe ciliatis.

c. Folia totius plantae plerumque indivisa.

d. Achaenia corpore 8–13 mm. longa. . 71. *B. segetum* var. *patula.*

d. Achaenia corpore 1–2.2 cm. longa. . . . . 72. *B. Shrevei.*

c. Folia plerumque divisa.

d. Involucri bracteae exteriores 9–15 mm. longae.

e. Folia tripartita. . . . . 73. *B. Holwayi.*

e. Folia bipinnata vel tripinnatisecta. . . . . 69. *B. Gentryi.*

d. Involucri bracteae exteriores 3–8 mm. longae.

e. Folia principalia pinnatim 3–7-partita.

f. Foliolum terminale anguste lanceolatum; caule pilis densis pubescenti; planta jamaicensi. . . . 64. *B. incisa.*

f. Foliolum terminale latius; caule glabro vel tomentoso.

g. Planta antillana, rarissime alibi crescens. . 63. *B. reptans.*

g. Planta Americae septentrionalis australisque, rarissime antillana. . 65. *B. squarrosa* (et raro 71. *B. segetum*).

e. Folia principalia 2–3-pinnata.

63. *B. reptans* var. *Urbanii* et var. *dissecta.*

b. Non scandentes (sed apud *B. clarendonensem* longe repentes).

c. Capitula perspicue radiata floribus ligulatis maxima ex parte flavis vel aurantiacis.

d. Achaenia aristata aristis retrorsum hamosis (raro caducis).

e. Flores ligulati rubido-aurantiaci; achaeniis validis, acute quadrangulatis, plus minusve recurvatis, plerumque 4-aristatis. . . . . 138. *B. Sambucifolia.*

e. Flores ligulati flavi.

f. Achaenia omnia valde cuneata, non alato-marginata.

g. Capitula hemisphaerica, ad anthesin plerumque cernua; involucri bracteis exterioribus reflexis vel vix adscendentibus; achaeniis transversim rhomboideis, faciebus graciliter atque obscure striatis, saepe tuberculatis.

h. Achaenia arcuata, valde carinata, cortice pallido marginata; paleis apice plerumque flavidis; ligulis usque ad circ. 1.7 cm. longis vel deficientibus; capitulis demum saepius cernuis.

92. *B. cernua* et var. *oligodonta.*

h. Achaenia recta, plana, non cortice-marginata; paleis apice rubidis; ligulis 1.5–3 cm. longis; capitulis raro cernuis. . . . . 93. *B. laevis.*

g. Capitula campanulata vel subhemisphaerica, ad anthesin erecta; involucri bracteis erectis adscendentibus; achaeniis biconvexis, grosse perspicueque striatis, non tuberculatis. . . . 94. *B. hyperborea* et varietates.

f. Achaenia exteriora obovata vel cuneato-obovata, margine plerumque interrupte crassiusculo-alata.

g. Involucri bracteae exteriores 8–10, saepius laeves vel leviter ciliatae, 0.5–1.2 cm. longae.

78. *B. aristosa* var. *Fritcheyi.*

g. Involucri bracteae exteriores plerumque 15–20, perspicue hispido-ciliatae, 1–2.7 cm. longae.
79. *B. polylepis* var. *retrorsa.*

f. Achaenia omnia magis elongata, plerumque cuneato-linearia vel anguste linearia.

g. Ligulae plerumque bicolores, basi purpureae alibi flavae.....158. *B. bicolor.*

g. Ligulae unius coloris.

h. Folia simplicia (raro formae simplicifoliae *B. aureae* stant hic).

i. Folia oblongo-ovata vel oblongo-lanceolata, margine integra vel raro 1-dentata; caule erecto.
101. *B. integrifolia.*

i. Folia ovato-lanceolata, serrata, petiolo adjecto plerumque 1.5–4 cm. longa; caulibus procumbentibus vel adscendentibus, 1–7 dm. longis; planta numquam in india occidentali crescente.
150. *B. triplinervia.*

i. Folia rhomboideo-ovata, grosse serrata 5–16 dentibus in unico latere, petiolo adjecto 5–10 cm. longa; caulibus repentibus, usque ad 4 m. longis; planta jamaicensi.61. *B. clarendonensis.*

i. Folia linearia; caule erecto.
146. *B. angustissima* var. *Linifolia.*

h. Folia divisa.

i. Herbae annuae vel biennes.

j. Planta demissa, saepe ramosissima, plerumque 1–2.5 dm. alta, foliis petiolo adjecto 1–5 (rarius –7.5) cm. longis.147. *B. Anthemoides.*

j. Planta erecta, moderate ramosa, plerumque altior, foliis saepius 0.5–2 dm. longis.

k. Achaenia interiora corpore 10–16 mm. longa.
154. *B. serrulata.*

k. Achaenia omnia corpore 4–7 mm. longa.

l. Folia principalia plerumque indivisa vel 3–5-partita, rarissime bipinnata.

m. Planta ±3 dm. alta; foliis petiolo adjecto 1.5–1.8 cm. longis; capitulis ad

anthesin circ. 1.5–1.8 cm. latis; floribus ligulatis plerumque 8.
98. *B. Coreocarpoides.*

m. Planta plerumque 5–10 dm. alta; foliis petiolo adjecto 0.8–2.2 dm. longis; capitulis ad anthesin 2–5 cm. latis; floribus ligulatis plerumque 5 vel 6.
100. *B. aurea.*

l. Folia principalia bi- vel subtripinnata.
97. *B. Ferulaefolia* et varietates.

i. Herbae perennes.

j. Involucri bracteae exteriores 10–20.

k. Folia principalia tripartita foliolis plus minusve ovatis.....156. *B. chiapensis.*

k. Folia principalia bipinnatisecta segmentis plus minusve linearibus.
155. *B. Geraniifolia.*

j. Involucri bracteae exteriores 5–10.

k. Flores ligulati fertiles.

l. Folia tripartita, foliolis ovatis vel rhomboideo-ovatis.....157. *B. Ostruthioides.*

l. Folia bipinnatisecta vel biternatisecta foliolis segmentisve cuneato-lanceolatis.
157. *B. Ostruthioides* var. *costaricensis.*

l. Folia bipinnatim dissecta segmentis longis filiformibus.....141. *B. nudata.*

k. Flores ligulati steriles.

l. Foliola angustissime linearia, plerumque 0.3–0.6 mm. lata..146. *B. angustissima.*

l. Foliola latiora.

m. Flores ligulati 5 vel 6.

n. Foliorum segmenta primaria subflabelliformia.....152. *B. insolita.*

n. Foliorum segmenta primaria non subflabelliformia.150. *B. triplinervia* var. *macrantha* et var. *mollis.*

m. Flores ligulati 7–10.

n. Involucri bracteae exteriores 9–12 mm. longae.....69. *B. Gentryi.*

n. Involucri bracteae exteriores 3–7 mm. longae...153. *B. canescens* (ac 147*a*. *B. Muelleri* et rarissima 150. *B. triplinervia* var. *macrantha* f. *octoradiata*).

d. Achaenia exaristata vel aristata aristis calvis vel antrorsum setosis.

e. Achaenia exteriora late cuneata vel cuneato-obovata.

f. Achaenia nigra corpore 2.5–4.5 mm. longa; involucri bracteis exterioribus 7–10.....81. *B. mitis.*

f. Achaenia brunnea vel subnigra, corpore 5–7.5 mm. longa.

g. Involucri bracteae exteriores 8–10, glabrae vel moderate ciliatae, quam interiores breviores.
78. *B. aristosa* et var. *mutica.*

g. Involucri bracteae exteriores 12–20, valde ciliatae vel grosse hispidae, quam interiores plerumque longiores.
79. *B. polylepis.*

e. Achaenia exteriora anguste cuneata vel linearia.

f. Folia indivisa, nitido-subcoriacea, rhomboideo-ovata; caulibus repentibus, usque ad 4 m. longis.
61. *B. clarendonensis.*

f. Folia divisa.

g. Planta demissa, saepe ramosissima, plerumque 1–2.5 dm. alta.....147. *B. Anthemoides.*

g. Plantae erectae, moderate ramosae, altiores.

h. Achaeniorum corpus et aristae similes soliditate; aristae transversim triangulatae.
80. *B. coronata* et var. *tenuiloba.*

h. Achaeniorum corpus et aristae soliditate dissimiles; aristae transversim teretes.

i. Involucri bracteae exteriores apicem versus plus minusve dilatatae, 1–2 mm. longae.
82. *B. Oerstediana.*

i. Involucri bracteae exteriores usque ad apicem lineares, 3–7 mm. longae.

j. Involucri bracteae exteriores circ. 12, plerumque 5–7 mm. longae.....151. *B. acrifolia.*

j. Involucri bracteae exteriores 6–8, plerumque 3–5 mm. longae.....96. *B. Schaffneri.*

c. Capitula discoidea vel subradiata vel perspicue radiata ligulis albis vel rosaceis vel rubris sed non vere flavis.

d. Achaenia late vel anguste cuneata, sub apice non angustata.[1]

e. Achaeniorum corpus striatum; foliis simplicibus vel profunde incisis vel (apud *B. tripartitam*) 3–5-partitis.

f. Achaenia marginibus antrorsum hamosa, saltem basi ipsa.

g. Capitula terminalia 8–30-flora.

h. Achaenia fere linearia, transversim plano-convexa, copiose pubescentia, sine costis medianis; aristis angustissimis, patentibus, vix dimidio quam corpore brevioribus.....76. *B. Bidentoides.*

h. Achaenia plana vel biconvexa, sparsim pubescentia, costis medianis perspicuis; aristis crassioribus, longitudine non plus tertia parte corporis.

i. Capitula terminalia saltem 8 mm. longa. 77. *B. Eatonii* et varietates.

i. Capitula terminalia 4–7 mm. longa. × *B. multiceps* (p. 208).

g. Capitula terminalia 30–60-flora.

h. Achaenia saltem matura ad apicem tetragona. 87. *B. connata* et varietates.

h. Achaenia plana.....88. *B. heterodoxa.*

f. Achaenia marginibus retrorsum hamosa pro tota longitudine.

g. Achaenia apice convexa ac cartilaginea.

h. Capitula hemisphaerica, ad anthesin plerumque cernua; involucri bracteis exterioribus reflexis, patentibus vel parce adscendentibus; achaeniis transversim rhomboideis, graciliter obscureque striatis, saepe tuberculatis.

i. Achaenia recta planaque, non valde carinata, sine marginibus corticis pallidae; paleis ad apicem rubidis; floribus ligulatis 1.5–3 cm. longis. 93. *B. laevis.*

[1] For purposes of comparison, the steps under this *d* have been made to correspond rather closely with those in Fassett's "A key to the northeastern American species of *Bidens*" (Rhodora 27: 184–185. 1925).

i. Achaenia arcuata, valde carinata, cortice pallida marginata; paleis ad apicem flavidis; floribus ligulatis usque ad 1.7 cm. longis.
92. *B. cernua* et var. *oligodonta.*

h. Capitula campanulata vel subhemisphaerica, ad anthesin erecta; achaeniis biconvexis, grosse ac profunde striatis, non tuberculatis.
94. *B. hyperborea* et varietates.

g. Achaenia apice nec convexa nec cartilaginea.

h. Folia principalia 3–5-secta vel -partita.

i. Flores ligulati 8–11, circ. 3.5–8 mm. longi; foliorum lamina segmentisve profunde atque acerrime incisis vel inciso-dentatis . . . 91. *B. amplissima.*

i. Capitula normaliter discoidea (rarissime subradiata); foliis normaliter 3–5-partitis, segmentis serratis dentatisve sed non plerumque incisis.
89. *B. tripartita.*

h. Folia simplicia . . . . . 86. *B. comosa.*

e. Achaeniorum corpus non striatum; foliis saltem 1–2-pinnatis, foliolo terminali plerumque petiolulato.

f. Involucri bracteae exteriores 3–5 (plerumque 4), non evidenter ciliatae . . . . . 83. *B. discoidea.*

f. Involucri bracteae exteriores 5–16, regulariter copioseque ciliatae.

g. Involucri bracteae exteriores 10–16; interiores quam discus breviores; achaeniis brunneis vel olivaceis.
85. *B. vulgata* et varietates.

g. Involucri bracteae exteriores 5–8; interiores disco aequales; achaeniis subnigris.
84. *B. frondosa* et varietates.

d. Achaenia linearia vel clavata sed numquam manifeste cuneata, supra saepe attenuata.

e. Involucri bracteae exteriores 3 vel 4, pro capitulo longissimae (1–2.5 cm.), nonnullae valde foliaceae atque irregulariter 1–2-pinnatim partitae . . . . . 124. *B. Lemmonii.*

e. Involucri bracteae exteriores simplices.

f. Achaeniorum aristae 3–5, regulariter una duaeve erectae reliquae reflexae . . . . . 137. *B. riparia.*

f. Achaenia exaristata vel aristata aristis inter se non regulariter diverse spectantibus.

g. Foliorum segmenta plerumque linearia vel capilliformia.

h. Herba perennis; floribus ligulatis 8–10, apice truncato grosse dentatis, 1.3–1.6 cm. longis.
145. *B. Pringlei.*

h. Herbae annuae.

i. Flores tubulosi pauci, plerumque 5–13.

j. Foliorum medianorum ac superiorum segmenta lineari-filiformia 0.5–1 mm. lata.
121. *B. heterosperma.*

j. Foliorum medianorum ac superiorum segmenta multo latiora.....114. *B. leptocephala.*

i. Flores tubulosi multo numerosiores.

j. Capitulorum juvenilium discus saltem dimidio bracteis exterioribus brevior; foliorum segmentis linearissimis 0.5–1 mm. latis.
125. *B. capillifolia.*

j. Capitulorum juvenilium discus bracteis exterioribus fere vel plene aequalis.

k. Involucri bracteae exteriores sub apice plerumque dilatatae; ligulis albidis vel rosaceis.
132. *B. pilosa* var. *bimucronata* f. *odorata* et var. *calcicola* f. *dissecta.*

k. Involucri bracteae exteriores sub apice raro dilatatae; ligulis flavis..118. *B. tenuisecta.*

g. Foliorum segmenta anguste lanceolata vel latiora.

h. Achaenia omnia etiam primum exaristata.

i. Achaenia omnia valde clavata, glabra; ligulis rosaceis.....109. *B. mollifolia.*

i. Achaenia non clavata, supra antrorsum hispida; ligulis albidis vel flavidis....111. *B. Brandegeei.*

h. Achaenia saltem interiora aristata.

i. Achaenia pauca, plerumque 5–14.

j. Achaenia matura plerumque plus minusve recurvata, superne late distantia.

k. Achaenia interiora corpore plerumque 12–21 mm. longa.....107. *B. Anthriscoides.*

k. Achaenia interiora corpore plerumque 7–10 mm. longa.....105. *B. oligantha.*

j. Achaenia matura recta vel subrecta, non superne distantia.

k. Flores ligulati deficientes vel circ. 3, tantum circ. 2.5 mm. longi...114. *B. leptocephala.*

k. Flores ligulati circ. 5, plerumque 5–7 mm. longi.

l. Folia pinnatim 3–5-partita.

m. Achaenia exteriora badia rubrave. 104. *B. amphicarpa.*

m. Achaenia omnia atra.103. *B. oligocarpa.*

l. Folia 2–3-pinnatisecta. 131. *B. pseudalausensis.*

i. Achaenia plerumque 16–50.

j. Flores ligulati pro capitulo perspicui, albi vel rosacei.

k. Involucri bracteae exteriores 7–9.

l. Ligulae rosaceae ac caules adscendentes vel plus minusve repentes, 1.5–4 dm. longi. 108. *B. Chrysanthemifolia.*

l. Nunc ligulae albidae vel rosaceae ac caules erectae, nunc caules repentes subscandentesve ac ligulae albae..132. *B. pilosa* var. *radiata,* var. *bimucronata,* et var. *calcicola.*

k. Involucri bracteae exteriores 9–16. 112. *B. aequisquama.*

j. Flores ligulati minuti vel deficientes.

k. Achaeniorum maturorum aristae 5–7 mm. longae ac divaricatae.....117. *B. cornuta.*

k. Achaeniorum aristae usque ad 4 mm. longae vel deficientes.

l. Achaenia plerumque recurvata; aristis 4–6. 136. *B. Cynapiifolia* et varietates.

l. Achaenia recta vel subrecta.

m. Folia simplicia vel simpliciter pinnata.

n. Achaenia valde dimorpha; nonnulla exteriora clavata, badia vel rubro-straminea, corpore tantum circ. 4.5–5.5 mm. longa.
113. *B. Bigelovii* var. *pueblensis.*

n. Achaenia plus minusve similia.

o. Folia 5-partita foliolo terminali circ. 2–3 cm. longo et 1–1.3 cm. lato; achaeniis plerumque 2-aristatis.
134. *B. domingensis.*

o. Folia simplicia vel 3-partita, lamina vel foliolo terminali 3.5–8 cm. longa et 2–4 cm. lata; achaeniis plerumque 3–4-aristatis.
128. *B. tenera* et var. *paucidentata.*

o. Folia rarissime simplicia plerumque 3–5-partita, lamina vel foliolo terminali plerumque 2–10 cm. longo, achaeniis 25–40, plerumque 2–3 (rarius 4–5) -aristatis.
132. *B. pilosa* et var. *minor.*

m. Folia foliolis saltem imis 2–3-pinnata.

n. Involucri bracteae exteriores 2–3 mm. longae; achaeniorum interiorum corpore 6–12 mm. longo; planta mexicana.....129. *B. duranginensis.*

n. Involucri bracteae exteriores 3–7.5 mm. longae.

o. Achaenia dimorpha, exteriora clavata, rubido-badia vel rubido-nigra, corpore tantum circ. 4–7 mm. longa, saepe setosiora; interiorum maturorum corporibus 8–12 mm. longis.

p. Folia tripartita interdum terminalibus interdum omnibus segmentis 3–5-partitis, lobis oblongis vel cuneatis; involucri bracteis exterioribus 6–9; achae-

niorum interiorum aristis saepe 3, circ. 1.5–3 mm. longis...113. *B. Bigelovii* et var. *pueblensis.*

p. Folia 1–2-pinnata, segmentis primariis lateralibus circ. 2 jugis, superioribus simplicibus inferioribus saepius tripartitis, segmentis lanceolatis acriter serratis; involucri bracteis exterioribus 8–12; achaeniorum interiorum aristis 2, circ. 1–1.5 mm. longis..99. *B. Townsendii.*

o. Achaenia inter se similia vel subsimilia, corpore quam 12 mm. saepe longiora; involucri bracteis exterioribus 3–5 mm. longis.

p. Aristae erecto-patentes..115. *B. bipinnata* et var. *biternatoides.*

p. Aristae erectae vel suberectae. 133. *B. subalternans.*

a. Plantae austro-americanae.

b. Flores ligulati plerumque brunneo-rubri vel purpurei, sicci saepe plus minusve cinnamomei.

c. Capitula pansa ad anthesin circ. 2.5–3 cm. lata; achaeniis valde tetragonis 3–4-aristatis aristis retrorsum et saepe oculis pectinatim hamosis.....139. *B. Gardneri.*

c. Capitula pansa ad anthesin circ. 4 cm. lata; achaeniorum subtetragonorum aristis abortivis..143. *B. Riedelii* et var. *hirsuta.*

b. Flores ligulati diversi vel deficientes.

c. Herbae vel frutices perennes plerumque scandentes.

d. Folia indivisa.

e. Capitula pansa ad anthesin circ. 1.5–2 cm. lata; foliis 1–3 cm. latis.....62. *B. monticola.*

e. Capitula pansa ad anthesin plerumque 3–5 cm. lata; foliis 3–5.5 cm. latis.

f. Involucri bracteae exteriores numerosae (plerumque 12–14), spathulato-obovatae, apice rotundae vel obtusissimae.....67. *B. simplicifolia.*

f. Involucri bracteae exteriores 7–9, late lineares vel linearispathulatae, apice acutae.

g. Achaenia corpore 8–13 mm. longa. . 71. *B. segetum* var. *patula* (rarissime etiam 65. *B. squarrosa*).

g. Achaenia corpore 1–2.2 cm. longa. . . . . 72. *B. Shrevei.*

d. Folia 3–5-partita.

e. Omnia folia tantum 2–3.5 cm. longa. . 68. *B. Vincaefolia.*

e. Folia longiora.

f. Folia plerumque subcoriacea ac rugosa. 66. *B. Rubifolia.*

f. Folia plus minusve membranacea.

g. Foliola valde perspicueque caudato-acuminata; achaeniis marginibus glabris . . . . . 70. *B. urophylla.*

g. Foliola moderate acuminata vel obtusiora; achaeniis ciliatis.

h. Foliola plerumque anguste lanceolata raro ovato-lanceolata; achaeniis corpore 8–13 mm. longis. 71. *B. segetum.*

h. Foliola vel ovata vel ovato-lanceolata vel lanceolata, raro angustiora; achaeniis corpore 6–9 mm. longis. 65. *B. squarrosa.*

c. Herbae annuae perennesve, non scandentes.

d. Una vel duae aristae erectae reliquae perspicue reflexae. 137. *B. riparia* et var. *refracta.*

d. Aristae diversae vel deficientes.

e. Folia simplicia.

f. Capitula discoidea.

g. Folia glaberrima.

h. Folia principalia (inferiora exclusa) usque ad 3.5 cm. longa et 0.2–1 mm. lata . . . 75. *B. fistulosa.*

h. Folia principalia 5–9 cm. longa et 2–3 cm. lata. 74. *B. graveolens.*

g. Folia tomentosa. . . . . 142. *B. brasiliensis.*

f. Capitula radiata.

g. Achaenia anguste cuneata, plana vel 3–4-angulata angulis retrorsum hamosis. . . . . 93. *B. laevis.*

g. Achaenia elongata et plus minusve lineari-fusiformia, corpore glabra vel antrorsum setosa.

h. Involucri bracteae exteriores apicem versus plus minusve dilatatae.
132. *B. pilosa* var. *radiata* f. *indivisa.*

h. Involucri bracteae exteriores superne angustatae.

i. Flores ligulati plerumque 5 vel 6.
150. *B. triplinervia.*

i. Flores ligulati plerumque 8–10.

j. Planta 1–2 m. alta; involucri bracteis exterioribus 8–14 mm. longis.....144. *B. Chodati.*

j. Plantae caules plerumque 2–6 dm. longi; involucri bracteis exterioribus 5–6.5 cm. longis.
148. *B. andicola.*

e. Folia divisa.

f. Foliorum segmenta anguste linearia vel flagellaria (hac stat raro etiam . . . 133. *B. subalternans* var. *simulans*).

g. Capitula discoidea vel vix subradiata.

h. Involucri bracteae exteriores 4–7, circ. 2–3 mm. longae; achaeniis corpore 8–13 mm. longis.
122. *B. exigua.*

h. Involucri bracteae exteriores 7–10, circ. 3–4 mm. longae; achaeniis corpore 1–1.4 cm. longis.
140. *B. flagellaris.*

h. Involucri bracteae exteriores 6–8, circ. 4–6 (rarius 8) mm. longae; achaeniis corpore 1–2.4 cm. longis.
130. *B. pseudocosmos.*

g. Capitula radiata.

h. Flores ligulati plerumque 4–6.

i. Flores ligulati tantum 3–4 mm. longi.
106. *B. Andrei.*

i. Flores ligulati saltem 1 cm. longi.
150. *B. triplinervia.*

h. Flores ligulati plerumque 8..148. *B. andicola* var. *tarijensis* f. *dissecta* (sed vide etiam 150. *B. triplinerviam* var. *macrantham* f. *octoradiatam*).

f. Foliorum lamina vel segmenta latiora.

g. Capitula perspicue radiata, floribus ligulatis manifeste flavis ac saltem 1 cm. longis.

h. Flores ligulati plerumque 5 vel 6.
150. *B. triplinervia* et varietates.

h. Flores ligulati plerumque 8.
148. *B. andicola* et varietates excl. var. *Mandonii.*

g. Capitula discoidea vel vix subradiata vel etiam radiata sed cum floribus ligulatis albis rosaceisve non vere flavis.

h. Involucri bracteae exteriores apicem versus dilatatae.

i. Achaenia interiora corpore 5–6 mm. longa, 2–3-aristata aristis plerumque 1.5–2 mm. longis.
110. *B. Abadiae* et var. *pilosoides.*

i. Achaenia interiora corpore 6–16 mm. longa, 2–3 (–5) -aristata aristis 2–4 mm. longis.
132. *B. pilosa* et varietates.

h. Involucri bracteae exteriores apicem versus plerumque non dilatatae.

i. Achaenia recurvato-falcata.
136. *B. Cynapiifolia* et var. *portoricensis.*

i. Achaenia recta.

j. Folia principalia unipinnata 3–5 foliolis.

k. Achaenia plerumque 2-aristata.

l. Herba gracilis, infra simplex; capitulis in fructu circ. 1.5 cm. altis et circ. 1 cm. latis . . . . 148. *B. andicola* var. *Mandonii.*

l. Herba subrobusta, infra valde ramosa; capitulis cum fructibus circ. 2–2.4 cm. alta et superne circ. 1–1.8 cm. lata . . 148. *B. andicola* var. *Cosmantha* f. *Buchtienii.*

k. Achaenia plerumque 3-aristata.
128. *B. tenera.*

k. Achaenia plerumque 4-aristata.

l. Achaenia plerumque 6–15 (raro –20); aristis saepius patentibus.
128. *B. tenera* var. *paucidentata.*

l. Achaenia numerosiora; aristis erectis.
133. *B. subalternans* var. *unipinnata.*

j. Folia principalia saltem 2–3-pinnata.

k. Achaenia exteriora (saltem demum) divaricata . 136. *B. Cynapiifolia* var. *portoricensis.*

k. Achaenia exteriora semper erecta vel suberecta.

l. Aristae erectae vel suberectae.

m. Foliola lateralia superiora circumambitu ovata, apice obtusa vel subacuta. 135. *B. Malmei.*

m. Foliola lateralia superiora circumambitu lanceolata vel linearia, apice valde acuta vel acuminata. 133. *B. subalternans* et var. *simulans.*

l. Aristae patentes.....115. *B. bipinnata.*

a. Plantae hemisphaerii orientalis africanae exclusae.

b. Achaenia moderate vel late cuneata non linearia, sub apice non angustata.

c. Achaenia faciebus striata.

d. Achaenia marginibus saltem basi ipsa 1-paucis setis antrorsum munita....87. *B. connata* var. *petiolata* et var. *fallax.*

d. Achaenia marginibus totam longitudinem retrorsum hamosa.

e. Achaenia apice convexa cartilagineaque.

f. Folia simplicia; achaeniis quadrangulatis quadriaristatis corpore 5–7.7 mm. longis.....92. *B. cernua.*

f. Folia normaliter pinnatim 3–5-partita; achaeniis planis biaristatis corpore 3–3.5 mm. longis...90. *B. radiata.*

e. Achaenia apice nec convexa nec cartilaginea. 89. *B. tripartita* et varietates.

c. Achaenia faciebus non striata; foliis pinnatim 3–5-partitis.

d. Involucri bracteae exteriores 5–8; interiores disco aequales. 84. *B. frondosa.*

d. Involucri bracteae exteriores 10–16; interiores quam discus breviores.....85. *B. vulgata.*

b. Achaenia linearia, apicem versus saepe angustata.

c. Capitula perspicue radiata, floribus ligulatis saltem 8 mm. longis.

d. Ligulae albae vel ochroleucae...132. *B. pilosa* var. *radiata.*

d. Ligulae flavae.

e. Folia petiolo adjecto 0.8–2.2 dm. longa; involucri bracteis exterioribus 8–17; achaeniis cuneato-linearibus, corpore 4–7 mm. longis.....100. *B. aurea.*

e. Folia petiolo adjecto plerumque 1.5–4 cm. longa; involucri bracteis exterioribus 5–9; achaeniis interioribus linearibus superne attenuatis, corpore 6–9 mm. longis.
150. *B. triplinervia* var. *macrantha.*

c. Capitula discoidea vel debiliter radiata floribus ligulatis plerumque 2–6 mm. longis.

d. Folia simpliciter pinnata.

e. Involucri bracteae exteriores apicem versus plus minusve dilatatae.....132. *B. pilosa* et var. *minor.*

e. Involucri bracteae exteriores superne angustatae et non dilatatae.....126. *B. biternata* et var. *glabrata.*

d. Folia saltem foliolis imis 2–3-pinnata.

e. Flores tubulosi 4-lobati, achaeniis 6–13, biaristatis; foliorum segmentis linearibus vel oblongo-linearibus.
123. *B. parviflora.*

e. Flores tubulosi 5-lobati; achaeniis plerumque 15–35.

f. Foliola ima tripartita caetera indivisa, omnia ovata vel lanceolata, multiserrata.
126. *B. biternata* et var. *glabrata.*

f. Foliola omnia 1–2-pinnata.....115. *B. bipinnata.*

a. Plantae africanae.

b. Flores ligulati rubidi vel violacei vel purpurei nec (vel sicci false) flavi nec albi.

c. Achaenia faciebus glabra; involucri bracteis exterioribus circ. 6–8.....166. *B. rubra.*

c. Achaenia faciebus plerumque setosa.

d. Ligulae atrorubrae vel atropurpureae....168. *B. leptolepis.*

d. Ligulae moderate violaceae.....167. *B. urceolata.*

b. Flores ligulati flavi vel raro albi, aut deficientes.

c. Foliorum saltem perpauci basales dentes capilliformes vel in setas veras elongatas desinentes; floribus tubulosis siccis ad medium plerumque plus minusve tumidis articulatisve ac fractis, plantis plurime abyssinicis vel eritreanis (raro 188. *B. Elliotii* adpropinquat).

d. Folia simplicia.

e. Folia opposita.

f. Folia anguste elongato-lanceolata.....227. *B. superba.*

f. Folia ovata vel anguste elliptica.
226. *B. Dielsii* et var. *medusoides.*

e. Folia ternatim verticillata.....229. *B. ternata.*

d. Folia divisa.

e. Capitula pansa ad anthesin 1–2.5 cm. lata et circ. 5 mm. alta.

f. Foliorum dentes saepissime seta terminati, involucri bracteae exteriores circ. 8.....230. *B. setigera.*

f. Foliorum dentes saepissime non setigeri, involucri bracteae exteriores circ. 6.....231. *B. setigeroides.*

e. Capitula majora, saepius 3–5 cm. lata.

f. Foliorum segmenta anguste linearia.
219. *B. chaetodonta* var. *glabrior* et 225. *B. chaetophylla.*

f. Foliorum segmenta latiora.

g. Petioli brevissimi alato-marginati raro usque ad 1 cm. longi.....220. *B. Rueppellii.*

g. Petioli plerumque 1–4 cm. longi.

h. Involucri bracteae exteriores 16–24; foliorum segmentis subtus albescentibus...224. *B. Cirsioides.*

h. Involucri bracteae pauciores; foliorum segmentis subtus viridibus pallidisve sed non albescentibus.

i. Folia 3–5-partita foliolis serratis ovatis vel lanceolatis.

j. Achaenia corpore 3–4 mm. longa; involucri bracteis exterioribus circ. 6–7 mm. longis.
221. *B. Vatkei.*

j. Achaenia corpore 3.5–4.5 mm. longa; involucri bracteis exterioribus 1.3–1.7 cm. longis; foliis 3–5-partitis.....223. *B. articulata.*

j. Achaenia corpore 4–6 mm. longa; involucri bracteis exterioribus 1–1.6 cm. longis; foliis 3-partitis.....222. *B. rotata.*

i. Folia 2–3-pinnatisecta foliolis saepius oblongo-linearibus vel lineari-lanceolatis.
219. *B. chaetodonta.*

c. Foliorum dentes numquam (sed pro *B. Elliotii* interdum imperfecte) capilliformes nec in setas veras elongatas desinentes.

d. Herbae annuae, achaeniis apice exaristato plus minusve incrassato-capitatis vel crassiusculo-anulatis.
233. *B. praecox.*

d. Herbae annuae, achaeniis apice non incrassato-capitatis nec crassiusculo-anulatis.

e. Capitula valde radiata.

f. Flores ligulati ± 1.2 cm. longi, aristis retrorsum hamosis.
171. *B. Schimperi* (forsitan etiam 172. *B. Onisciformis*).

f. Flores ligulati 2–2.5 cm. longi; aristis antrorsum hispidulis vel deficientibus.

g. Involucrum maturum ± 2 cm. latum, bracteis exterioribus 0.7–2 cm. longis. . 163. *B. Steppia* et varietates.

g. Involucrum maturum ± 1 cm. latum, bracteis exterioribus circ. 4–7.5 mm. longis. . 182. *B. kivuensis* (vide etiam 161. *B. Grantii* et var. *Scaettae;* etiam 163. *B. Steppia* var. *Elskensii*).

e. Capitula discoidea vel debiliter radiata floribus ligulatis usque ad circ. 7 mm. longis.

f. Foliorum segmenta anguste linearia.

g. Rami acutissime angulati et fere subalati.
102. *B. acuticaulis.*

g. Rami tantum moderate angulati vel subtetragoni.

h. Achaenia exaristata.

i. Achaenia circ. 5–7 mm. longa; capitulis pansis ad anthesin 3.5–5.5 cm. latis.
163. *B. Steppia* var. *ambacensis.*

i. Achaenia 2.2–3.5 mm. longa; capitulis pansis ad anthesin ± 1.2 cm. latis. . . . . 231. *B. setigeroides.*

h. Achaenia aristata.

i. Involucri bracteae exteriores 1–2 mm. longae, interiores 4–5 mm. longae; ligulis manifestis profunde incisis nunc 3–7 nunc 7–13 mm. longis.
95. *B. diversa* et var. *megaglossa.*

i. Involucri bracteae exteriores demum circ. 4–8 mm. longae.

j. Achaenia supra medium sensim angustata; aristis retrorsum hamosis. . 120. *B. paupercula.*

j. Achaenia plerumque anguste sed perspicue oblonga; aristis antrorsum hispidis. 119. *B. straminoides.*

f. Foliorum segmenta lineari-lanceolata vel latiora.

g. Involucri bracteae exteriores apicem versus plerumque dilatatae.

h. Disci flores (et quam ob rem achaenia) 6–12; foliis plurime simplicia.....127. *B. Engleri.*

h. Disci flores multo numerosiores; foliis plerumque pinnatim 3–5-partitis..132. *B. pilosa* et varietates.

g. Involucri bracteae exteriores apicem versus anguste lineares itaque non dilatatae.

h. Folia pinnatim vel subbipinnatim 3–9-partita; foliolis (vel segmentis) ovatis vel ovato-lanceolatis, multiserratis.

i. Foliola inferiora raro divisa.

j. Achaenia 2- vel 3-aristata, corpore 1.2–1.6 cm. longa.....116. *B. cylindrica.*

j. Achaenia (exteriora excepta) plerumque 4-rariter 3–6-aristata, corpore usque ad 2.5 cm. longa.....126. *B. biternata* var. *glabrata.*

i. Foliola inferiora plerumque divisa. 126. *B. biternata.*

h. Folia 2–3-pinnatisecta.....115. *B. bipinnata.*

d. Herbae perennes vel verisimiliter perennes.

e. Achaeniorum aristae saltem ad summam plurime retrorsum hamosae vel retrorsum hispidae, raro deficientes.

f. Folia omnia indivisa vel interdum flabelliformi-incisa.

g. Folia rotundata vel flabellata.

h. Achaenia corpore 5–6 mm. longa.213. *B. Volkensii.*

h. Achaenia exteriora corpore ± 9 mm. interiora ± 16 mm. longa.....197. *B. flabellata.*

g. Folia plus minusve lanceolata.

h. Achaeniorum aristae valde retrorso-hamosae.

i. Involucri bracteae exteriores 10–14, circ. 8–10 mm. longae.....201. *B. andongensis.*

i. Involucri bracteae exteriores circ. 8, circ. 6–8 mm. longae.....200. *B. Moorei* et var. *verrucosa.*

h. Achaeniorum aristae non nisi ad apicem retrorsum hamosae.

i. Folia utrinque dense sed non perspicue verrucoso-scabra, aliter glabra, 3.5–4.5 cm. lata. 202. *B. Buchneri.*

i. Folia subtus scabrido-hispida, 1.5–3 cm. lata. 204. *B. Seretii.*

f. Nonnulla vel omnia folia divisa.

g. Foliorum segmenta principalia linearia.

h. Paleae interiores supra longissime et perspicuissime lineari-productae; achaeniorum aristis demum valde divaricatis.....196. *B. lineariloba.*

h. Paleae et aristae diversae.

i. Achaeniorum aristae nudae vel antrorsum hamosae vel rarius perpaucis hamis retrorsum hamosae, vel etiam deficientes.

j. Nonnulla folia indivisa alia paucilobata. 192. *B. ambigua.*

j. Folia omnia valde 1–2-pinnata.

k. Capitula pansa ad anthesin circ. 2–2.5 cm. lata; achaeniis 0.8–1.2 mm. latis. . 187. *B. Taylori.*

k. Capitula pansa ad anthesin 3–4.5 cm. lata; achaeniis 1.4–2 mm. latis. 181. *B. Schlechteri.*

i. Achaeniorum aristae regulariter retrorsum hamosae.

j. Folia (petiolo adjecto) plerumque 1.5–7 (raro –9.5) cm. longa.

k. Foliorum segmenta plerumque late oblongeve linearia.....177. *B. Whytei.*

k. Foliorum segmenta angustiora.

l. Involucri bracteae exteriores plerumque 4–8 mm. longae.

m. Capitula discoidea.....195. *B. crocea.*

m. Capitula radiata.

n. Capitula pansa ad anthesin 3–4.5 cm. lata et 9–12 mm. alta; achaeniis corpore 9–13 mm. longis. 184. *B. Bequaertii.*

n. Capitula pansa ad anthesin 2.5–3 cm. lata et 6–9 mm. alta; achaeniis corpore 5–9 mm. longis.

o. Folia pinnata vel subbipinnatipartita, subcarnosa, achaeniis interioribus corpore 7–9 mm. longis. 173. *B. Hoffmannii.*

o. Folia bi-tripinnatipartita, valde membranacea, achaeniis interioribus corpore 6–7 mm. longis. 178. *B. gracilior* var. *ukerewensis.*

l. Involucri bracteae exteriores 3–4 mm. longae.....180. *B. palustris.*

j. Folia (petiolo adjecto) 9–15 cm. longa. 189. *B. Phalangiphylla.*

g. Foliorum segmenta principalia latiora.

h. Nonnulla folia 1–2.6 dm. longa; foliolis lateralibus 1–4 jugis, late lanceolatis, 1–4 cm. latis; plantis elatis 1–3 m. altis.....186. *B. magnifolia.*

h. Folia plerumque usque ad 1 dm. longa; foliolis lateralibus minoribus; plantis quam 1 m. non (nisi *B. kilimandscharicae*) altioribus.

i. Folia principalia valde 2–3-pinnatisecta.

j. Capitula pansa ad anthesin 2.5–4 cm. lata et 6–9 mm. alta.....178. *B. gracilior.*

j. Capitula pansa ad anthesin 4–6 cm. lata et 1–1.3 cm. alta.

k. Involucri glabri bracteae exteriores circ. 5, plerumque 4–7 mm. longae, interiores multo majores.....185. *B. Hildebrandtii.*

k. Involucri dense hispido-tomentosi bracteae exteriores ± 8, circ. 8 mm. longae, interiores aequales.....159. *B. Holstii* var. *rupestris.*

i. Folia principalia pinnatim 3–5-partita foliolis dentatis vel vix subsectis.

j. Capitula pansa ad anthesin 5–8 cm. lata et circ. 1–1.2 cm. alta.

k. Foliorum segmenta plerumque lanceolata vel ovato-lanceolata, apice angustata. 191. *B. robustior.*

k. Foliorum laminae vel segmenta saepius ovata vel ovato-lanceolata, apice saepius obtusa. 210. *B. kilimandscharica* var. *retrorsa.*

j. Capitula pansa ad anthesin 2–3.5 cm. lata et 5–8 mm. alta.

k. Foliolum terminale ovatum.

l. Involucri bracteae exteriores circ. 4–5 mm. longae; achaeniis corpore 5–6 mm. longis et circ. 1 mm. latis. . . . 213. *B. Volkensii.*

l. Involucri bracteae exteriores 7–10 mm. longae; achaeniis corpore 6–8 mm. longis et circ. 1.3 mm. latis. . 212. *B. ukambensis.*

k. Foliolum terminale cuneate vel oblonge lanceolatum.

l. Folia subsessilia vel breviter petiolata petiolis 2–6 mm. longis; achaeniis corpore circ. 5 mm. longis. . 214. *B. lineata.*

l. Folia petiolata petiolis 0.5–2 cm. longis; achaeniis corpore ± 9 mm. longis. 194. *B. cinerea.*

e. Achaeniorum aristae nunc manifestae et nudae vel plus minusve antrorsum hamosae vel antrorsum hispidae, nunc deficientes.

f. Folia plerumque indivisa.

g. Folia linearia. . . . . 216. *B. Schweinfurthii.*

g. Folia latiora.

h. Folia (si simplicia) ovata vel subrhomboideo-ovata.

i. Involucrum late plano-hemisphaericum; floribus ligulatis 10–18. . . . . 206. *B. grandis.*

i. Involucrum altius; floribus ligulatis 8–10.

j. Capitula pansa ad anthesin ± 2.8 cm. lata, achaeniis corpore 4–5 mm. longis. 228. *B. Neumannii.*

j. Capitula pansa ad anthesin 6–7 cm. lata, achaeniis longioribus.

k. Flores ligulati 10–12. 208. *B. Brucei* et var. *pubescentior.*

k. Flores ligulati circ. 8.

l. Achaenia corpore 6–6.5 mm. longa.
209. *B. Crataegifolia.*

l. Achaenia corpore 7–9 mm. longa.
208. *B. Brucei* var. *Swynnertonii.*

h. Folia oblongo-lanceolata vel angustiora.

i. Folia subtus glabra vel aegre pubescentia.

j. Flores ligulati 6–8.....198. *B. Baumii.*

j. Flores ligulati circ. 12.

k. Involucri bracteae extimae ovato-lanceolatae, usque ad 1.5 cm. latae..207. *B. coriacea.*

k. Involucri bracteae exteriores lineari-acuminatae vel anguste lanceolatae, 1.5–2.5 mm. latae.

l. Folia subsessilia.
226. *B. Dielsii* et var. *medusoides.*

l. Folia principalia tenuiter longeque petiolata.....199. *B. ruandensis.*

i. Folia subtus scabrida vel scabrido-hispida vel glanduloso-pilosa.

j. Achaenia marginibus apiceque glabra.
215. *B. Aspilioides.*

j. Achaenia plus minusve setosa.

k. Folia inferne (plerumque sensim) ad basim saepissime angustata; folia principalia quam internodia plerumque multo longiora.

l. Involucri bracteae exteriores circ. 1.3–1.7 (–3) cm. longae, in capitulo discum facile superantes; achaeniis corpore 5–10 mm. longis et 1.4–2 mm. latis.204. *B. Seretii.*

l. Involucri bracteae exteriores circ. 0.9–1.2 cm. longae, in capitulo juniore disco subaequales; achaeniis corpore 1–1.4 cm. longis et 3–4.5 mm. latis.
203. *B. somaliensis.*

k. Multa folia inferne lata et truncata; folia principalia quam internodia breviora.
205. *B. Stuhlmannii.*

f. Folia plerumque divisa.

g. Foliorum segmenta linearia.

h. Folia pinnata vel vix bipinnatisecta.

i. Involucrum ad anthesin ± 2.3 cm. latum et ± 1.1 cm. altum.

j. Foliolum terminale elongate tenuiterque lineare. 218. *B. Rogersii.*

j. Foliolum terminale late lineare vel anguste subrhomboideo-lanceolatum. . . 217. *B. nyikensis.*

i. Involucrum ad anthesin multo minus.

j. Capitula pansa ad anthesin 1.4–2 cm. lata. 175. *B. musoziana.*

j. Capitula pansa ad anthesin 2–3.5 cm. lata.

k. Involucri plus minusve glabrati bracteae exteriores 3–5.

l. Involucrum superne ad anthesin 5–8 mm. latum. . . . . 174. *B. Kirkii.*

l. Involucrum superne ad anthesin 12–15 mm. latum. . . . . 192. *B. ambigua.*

k. Involucri pubescentis bracteae exteriores 7–14.

l. Bracteae exteriores 7–10; foliorum petiolis 0.5–4 cm. longis; achaeniis biaristatis.

m. Folia 4–8 cm. longa. 193. *B. ugandensis.*

m. Folia 0.7–1.7 dm. longa. 183. *B. Mildbraedii.*

l. Bracteae exteriores 10–14; foliorum petiolis 2–6 mm. longis; achaeniis exaristatis. 176. *B. Mossii.*

h. Folia 2–3-pinnatisecta.

i. Involucrum pansa ad anthesin 2–3 cm. latum, bracteis exterioribus circ. 1–1.2 cm. longis. 190. *B. insecta.*

i. Involucrum pansa ad anthesin multo angustius.

j. Involucri bracteae exteriores lineari-elongatae, multae 8–11 mm. longae. . . 188. *B. Elliotii.*

j. Involucri bracteae exteriores 3–7 mm. longae.

k. Capitula pansa ad anthesin circ. 2–2.5 cm. lata. . . . . 187. *B. Taylori.*

k. Capitula pansa ad anthesin 3–4.5 cm. lata.

l. Glabra, 5–9 dm. alta, ovariis biaristatis. 181. *B. Schlechteri.*

l. Plus minusve hispida, ± 2 m. alta, ovariis plerumque exaristatis . 182. *B. kivuensis.*

g. Foliorum segmenta lanceolata vel latiora.

h. Planta pusilla, prostrata.....149. *B. microphylla.*

h. Plantae majores.

i. Folia principalia magna petiolo adjecto plerumque 1–2.6 dm. longa, foliolis lateralibus late lanceolatis plerumque 1–4 cm. latis. 186. *B. magnifolia.*

i. Folia principalia usque ad 1 rarius ad 1.5 dm. longa.

j. Achaenia minima tantum 3–4 mm. longa et 0.6–1.2 mm. lata.....179. *B. microcarpa.*

j. Achaenia majora.

k. Folia crassiuscula pinnatim 3–5-partita, foliolis late linearibus vel rhomboideo-lanceolatis, saepius integris vel 1–2-dentatis. 217. *B. nyikensis.*

k. Folia diversa.

l. Folia plerumque 3–5-partita foliolis ovatis et apice obtusis.

m. Involucrum late hemisphaericum vel subpatelliforme; bracteis exterioribus plerumque adpressis . .206. *B. grandis.*

m. Involucrum altius; bracteis exterioribus mox reflexis.

n. Achaeniorum aristae saepius 3, circ. 2–2.5 mm. longis (saepe unco unico prominulo).....212. *B. ukambensis.*

n. Achaeniorum aristae 2, circ. 1–2 mm. longae (supra semper glabrae).

o. Involucri bracteae exteriores 4–8 mm. longae, quam interiores manifeste breviores. .211. *B. rhodesiana.*

o. Involucri bracteae subaequilongae (circ. 8–15 mm.). 210. *B. kilimandscharica.*

l. Nonnulla vel multa folia 3–5-partita, foliolo terminali late angusteve lanceolato.

m. Folia valde membranacea, foliolis acerrimis, involucri bracteis exterioribus inferne connatis..232. *B. phelloptera.*

m. Folia crassiora, foliolis vel segmentis obtusioribus, involucri bracteis exterioribus inferne distinctis.

n. Herba glabra.....165. *B. asperata.*

n. Caulis (saltem supra) et folia pubescentia.

o. Foliorum principalium petioli 2–3 cm. longi; involucri bracteis exterioribus 7–11..209. *B. Crataegifolia.*

o. Foliorum principalium petioli 0.5–1.5 cm. longi; involucri bracteis exterioribus 13–16.
160. *B. kamerunensis.*

l. Folia dissectiora, segmentis apice subacutis vel acrioribus.

m. Foliorum principalium segmenta terminalia acriter elongata vel elongato-attenuata.

n. Achaenia corpore 4.5–6 mm. longa et 0.6–1 mm. lata.....178. *B. gracilior.*

n. Achaenia corpore circ. 1.5 cm. longa et circ. 1 mm. lata.
185. *B. Hildebrandtii.*

m. Foliorum segmenta terminalia non acriter elongata.

n. Flores ligulati 7–9, aurantiaci (i.e., rubido-flavi); achaeniis atro-brunneis corpore circ. 8–9 mm. longis.
164. *B. rufovenosa.*

n. Flores ligulati flavi.

o. Foliorum segmenta saepius crassiuscula, subtus tomentulosa vel piloso-pubescentia.

p. Achaenia interiora corpore 4–6 mm. longa; involucro superne

ad anthesin circ. 1.7–2.2 cm. lata.....159. *B. Holstii.*

p. Achaenia interiora corpore 6–8.3 cm. longa; involucro superne ad anthesin circ. 8–12 mm. lata.....161. *B. Grantii.*

o. Foliorum segmenta manifeste membranacea, subtus parce hispida.

p. Folia plus minusve hispida, involucri bracteis exterioribus linearibus hispidisque, achaeniis 0.6–1.4 mm. latis.

q. Folia supra subdense hispida; bracteis exterioribus 5–9 mm. longis, quam interioribus raro longioribus; floribus ligulatis circ. 2.5 cm. longis; aristis antrorsum hispidulis ± 1.5 mm. longis..162. *B. Uhligii.*

q. Folia supra sparsim hispida; bracteis exterioribus 7–12 mm. longis, interiores superantibus; floribus ligulatis circ. 1.5–1.8 cm. longis; aristis nunc deficientibus nunc usque ad 1 mm. longis sed glabris..170. *B. Fischeri* (cf. etiam 172. *B. Onisciformem,* speciem cum capitulis ad anthesin cernuis et circ. 2 cm. latis, floribus ligulatis 8–10 mm. longis, etc.).

p. Folia glabrata, involucri bracteis exterioribus late oblongis ac glabris, achaeniis 1.5–2.2 mm. latis.....169. *B. taitensis.*

ABBREVIATIONS USED FOR HERBARIA CITED

Barn.	Herb. Barnard College, New York City.
Berl.	Herb. Berlin Botanical Garden, Germany.
Bish.	Herb. Bernice Pauahi Bishop Museum, Honolulu.
Bn.	Herb. Ross S. Bean, Honolulu.

Boiss.	Herb. Boissier, Geneva, Switzerland.
Bol.	Herb. University of Bologna, Italy.
Brit.	Herb. British Museum of Natural History, South Kensington.
Bucht.	Herb. Dr. Otto Buchtien, La Paz, Bolivia.
Bruss.	Herb. National Botanical Garden, Brussels.
Buit.	Herb. Buitenzorg Botanical Garden, Java.
Burn.	Herb. Emile Burnat, Geneva, Switzerland.
Calif.	Herb. University of California, Berkeley.
Can.	Herb. Canadian Geological Survey, Ottawa.
Carn.	Herb. Carnegie Museum, Pittsburgh.
Cluj	Herb. University of Cluj, Roumania.
Cop.	Herb. University of Copenhagen, Denmark.
Corn.	Herb. Cornell University, Ithaca, New York.
Coss.	Herb. Ernest Saint-Charles Cosson (now in Museum of Natural History, Paris).
Deam	Herb. Charles C. Deam, University of Indiana.
Deg.	Herb. Otto Degener, Honolulu.
Del.	Herb. Delessert, Geneva, Switzerland.
D.U.Prag.	Herb. German University, Prague.
Field	Herb. Field Museum of Natural History, Chicago.
Flor.	Herb. Institute of Botany, University of Florence, Italy.
Gen.	Herb. University of Geneva, Switzerland.
Goth.	Herb. Gothenburg Arboretum (Botan. Trädgård), Sweden.
Gray	Herb. Gray, Harvard University, Cambridge, Massachusetts.
Greene	Herb. Edward Lee Greene, University of Notre Dame, Indiana.
Hamb.	Herb. Botanical Institute of Hamburg, Germany.
Hassl.	Herb. Emil Hassler, Geneva, Switzerland.
Haw.	Herb. University of Hawaii, Honolulu.
Hll.	Herb. University of Halle, Germany.
Kew	Herb. Royal Botanical Gardens, Kew, England.
Kiel	Herb. University of Kiel, Germany.
Kioto	Herb. Imperial University of Kioto, Japan.
Leyd.	Herb. Royal Museum, Leyden, Netherlands.
Linn.	Herb. Linnaeus, Linnean Society, London.
Lps.	Herb. University of Leipsic, Germany.

Man.	Herb. Bureau of Science of the Philippine Islands, Manila.
Minn.	Herb. University of Minnesota, Minneapolis.
Mo.	Herb. Missouri Botanical Garden, St. Louis.
Mun.	Herb. Munich Botanical Garden, Germany.
Mus. Cong.	Herb. Musei Congoensis, Tervueren, Belgium (recently amalgamated with that of the National Botanical Garden, Brussels).
Mus. Prag.	Herb. National Museum, Prague.
Mus. V.	Herb. Museum Natural History, Vienna.
N. Eng.	Herb. New England Botanical Club, Cambridge, Massachusetts.
N.Y.	Herb. New York Botanical Garden, New York City.
Oxf.	Herb. University of Oxford, England.
Par.	Herb. Museum of Natural History, Paris.
Penn.	Herb. University of Pennsylvania, Philadelphia.
Petrop.	Herb. Botanical Garden of Leningrad (Hortus Petropolit.), U.S.S.R.
Phila.	Herb. Philadelphia Academy of Natural Sciences, Philadelphia.
Pom.	Herb. Pomona College, Claremont, California.
Rog.	Herb. Reverend F. A. Rogers, England.
Stanf.	Herb. Stanford University, California.
Stockh.	Herb. Museum of Stockholm, Sweden.
Transsilv.	Herb. Museum Transsilvania, Cluj, Roumania.
Tur.	Herb. University of Turin, Italy.
U.S.	Herb. United States National Museum, Washington.
U.V.	Herb. University of Vienna, Austria.
Webb	Herb. Webb, Botanical Institute of University of Florence, Italy.
Willd.	Herb. Willdenow, Berlin.
Wis.	Herb. University of Wisconsin, Madison.

1. **Bidens Ahnnei** Sherff, Bot. Gaz. 76: 165. 1923; ibid. 85: 23, *pl. 1, figs. i–p.* 1928. Pl. I, figs. *i–p.*

Fruticosa, ramosa, 5–10 dm. alta; caule glabro. Folia petiolata petiolis anguste marginatis et 1.5–2.5 (in cultu –4.5) cm. longis, petiolo adjecto 5–8.5 (in cultu –14.5) cm. longa et 2–3.5 (in cultu –6.5) cm. lata, indivisa (vel juvenilia saepe irregulariter regulariterve tripartita), membranacea, oblongo-ovata, apice breviter et sub-

abrupte acuminata, basi ad petiolum valde rotundata sed non vero cordata, argute serrata, non ciliata, supra glabra, infra ad venas praecipue petiolum versus saepe pilis tenuibus articulatisque pilosa. Capitula multa, minima, in inflorescentia dense corymboso-cymosa disposita, radiata, pansa ad anthesin 7–12 mm. lata et 2–5 mm. alta; pedicellis tenuibus, glabris, nudis vel saepius minute 1–4-bracteolatis, 7–20 mm. longis. Involucrum glabrum, demum 4–5 mm. latum et 4–5 mm. altum; bracteis exterioribus 4–6, linearibus, interdum ciliatis vel irregulariter 1–3-laciniatis, apice subacuto saepius nitido-callosis, 2–2.5 mm. longis; interioribus oblongis, supra saepe margine diaphano dilatatis, quam exterioribus non plerumque longioribus. Flores ligulati 3–5, flavi, ligula anguste elliptico-oblongi vel oblongo-ovati, 8–11 striis percursi, apice subintegri vel acute dentati, tantum 4–5 mm. longi. Achaenia minuta, exalata, lineari-clavata, interdum paulo torta, subtetragona, atra, ad angulos praesertim supra setulis suberectis instructa, circ. 8-sulcata (toto achaenio), apice calva, tantum 3–4 mm. longa et 0.3–0.5 mm. lata.

Type specimen: Collected by *Charles Henry*, mountain near Hakaui, Island of Nukahiva, Marquesas Islands, in 1916 (Field, 2 sheets).

Distribution: Known only from type locality, Island of Nukahiva, Marquesas Islands.

Specimens examined: *Charles Henry*, mountain near Hakaui, 1916 (type, Field, 2 sheets); *E. E. Sherff 3083*, January 6, 1919, et *idem 3085*, January 27, 1919, both cultivated in University of Chicago greenhouses from achenes of type material planted September, 1917 (Field, many sheets); *idem 3090*, cultivated from type achenes (Bish.).

The species was named for Mr. St. Ahnne, who, as President of the Chamber of Agriculture of Tahiti in 1916, kindly enlisted the services of Mr. Henry of Nukahiva in securing the type material (cf. Sherff, Bot. Gaz. 70: 92. 1920).

Mr. Henry's original label bears the notation, "rare."

EXPLANATION OF PLATE I, FIGS. *i–p*

Bidens Ahnnei: i, flowering and fruiting branch, ×0.6; *j*, exterior involucral bract, ×6; *k*, interior involucral bract, ×6; *l*, ligule, ×6; *m*, palea, ×6; *n*, disc corolla, ×6; *o*, *p*, achenes, ×6; all from first type sheet.

2. **Bidens polycephala** Schz. Bip. Flora 39: 360. 1856; Sherff, Bot. Gaz. 85: 23, *pl. 1, figs. a–h.* 1928. Pl. I, figs. *a–h.*

Campylotheca polycephala Schz. Bip. loc. cit.

Coreopsis polycephala (Schz. Bip.) Benth. & Hook. ex Drake del Cast. Ill. Fl. Ins. Mar. Pacif. 210. 1890; cf. Drake del Cast. Fl. Polynes. Fr. 108. 1893.

Fruticosa, 5–10 dm. alta; caule glabro, tereti, ramoso. Folia longe ac tenuiter petiolata petiolis 2–5 (pro inferioribus –10.5) cm. longis, petiolo adjecto 7–12 (inferiora –22) cm. longa, indivisa (vel juvenilia saepe profunde tripartita), oblongo-lanceolata vel saepius fere exacte ovata, apice acriter acuminata, margine plerumque argute serrata serraturis 10–15 vel etiam usque ad 37 in unico latere, rarius subintegra, non ciliata, membranacea, supra glabra, infra ad venas (praesertim petiolum versus) pilis paucis tenuibus articulatisque pilosa. Capitula corymbose disposita vel etiam subumbellata, parva, tenuiter pedicellata pedicellis usque ad 2.7 cm. longis, radiata, pansa ad anthesin tantum 7–10 mm. lata et 4–5 mm. alta; disco demum 3–4 mm. lato et circ. 4 mm. alto. Involucri bracteae exteriores 4 vel 5, lineares vel lineari-oblongae, saepe acutae, margine ciliatae vel saepe irregulariter 1–3-laciniatae, 1.2–2 mm. longae; interiores oblongae, supra plerumque margine diaphano dilatatae, quam exteriores dimidio longiores. Flores ligulati 3–5, flavi, elliptici, plerumque 8–10 striis percursi, apice obtuso dentati, 4–5 mm. longi. Achaenia in speciminibus spontaneis linearia vel lineari-fusiformia, exalata, tetragona vel obcompresso-tetragona, nigra, omnino manifeste 8 (unica facie 2) -sulcata, supra sensim angustata et terminaliter in apicem crassum dilatata, angulis sparsim adscendenti-setulosa, corpore 2–3 mm. longa et 0.7 etiam usque ad 1 mm. lata, apice calva vel brevissime 1- vel 2-aristata aristis adrecte hispidulis et usque ad 0.3 mm. longis; in speciminibus cultis angustiora et magis elongata, corpore 2.5–3.2 mm. longa et 0.4–0.7 mm. lata.

Type specimen: Collected by *Edelstan Jardin*, No. 40, Mt. Taiohae, Island of Nukahiva, Marquesas Islands, 1852–1854 (Par.).

Distribution: Known only from the islands of Nukahiva and Tauata (Santa Christina), Marquesas Islands.

Specimens examined: *Bennett* 45, Santa Christina (Berl.); *F. B. H. Brown* 405*A*, alt. above 500 meters, Taipi Vai, Nukahiva, May 7, 1921 (Bish.); *idem* 405*B*, alt. 800 meters, ridge, Hakaui, Nukahiva, eodem tempore (Bish.); *Ch. Henry*, very rare, Mt. Taie Kaoa, northern Nukahiva, 1916 (Field); *idem*, very rare, Mt. Kaea, north-

ern Nukahiva, 1916 (Field); *idem*, Nukahiva, 1917 (Par.); *Hinds*, Marquesas Isls., 1841 (Kew); *Jardin* 40 (type, ex herb. Schz. Bipontini, Par.; aliud specimen sed sine numero ex herb. Jardinii, Par.); *Langsdorff*, Nukahiva, 1813 (Brit.); *E. H. Quayle* 1588, alt. 800 meters, ridge, Nukahiva, October 18, 1922 (Bish.); *E. E. Sherff* 3082, cult. in University of Chicago greenhouses from seed (*Ch. Henry*, Nukahiva, 1917) planted September, 1917, collected December 18, 1918 (Field, 6 sheets); *idem* 3084, same as 3082, but collected January 6, 1919 (Field, 4 sheets); *idem* 3084*a*, same as 3082, but collected September 17, 1919 (Bish.); *idem* 3084*b*, same as 3082, but collected December 22, 1919 (Bish.); *idem* 3085*x* and 3086, same as 3082, but collected January 27, 1919 (Field, 2 sheets of each).

EXPLANATION OF PLATE I, FIGS. *a–h*

Bidens polycephala: a, flowering and fruiting branch, ×0.6; *b*, exterior involucral bract, ×6; *c*, interior involucral bract, ×6; *d*, ligule, ×6; *e*, palea, ×6; *f*, disc corolla, ×6; *g*, *h*, achenes, ×6; all from *Ch. Henry*, Mt. Taie Kaoa, Isl. Nukahiva, 1916, in Hb. Field.

3. **Bidens deltoidea** J. W. Moore, Bishop Mus. Bull. 102: 46. 1933.

Suffruticosa, usque ad 1 m. alta, caule erecto glabro supra ramoso, ramis subgracilibus. Folia tenuiter petiolata petiolis basi ipsa in juventute ciliolatis mox glabris usque ad 2.5 cm. longis, petiolo adjecto 4.5–11.5 cm. longa et 1.5–4 cm. lata, simplicia, ovata vel oblongo-lanceolata vel lanceolata, apice caudata cauda integra 7–18 mm. longa, basi sublate cuneata, margine acriter serrulata dentibus saepius inflexis, membranacea, glabra, venulis secundariis 5–9 utroque latere costae instructa. Capitula subnumerosa corymbose in inflorescentia usque ad 6 cm. longa terminali et in axillis foliorum superiorum subtabescente disposita, campanulata, radiata, pansa ad anthesin circ. 7 mm. lata et 4 mm. alta; pedicellis glabris usque ad 2.5 cm. longis. Involucri bracteae exteriores 5–8, oblongae vel attenuato-lineares, apice saepe obtusae, extus ad basim pilis brevibus sparsim pubescentes, 1–3 mm. longae et sub 1 mm. latae. Flores ligulati ± 4, subflavi, ligula elliptici, apice emarginati vel breviter 3-lobati, 3.5–4.5 mm. longi. Paleae lineares, 3 mm. longae et 0.3–1 mm. latae. Achaenia obcompressa, lineari-oblonga, atra vel apicaliter brunnea, utraque facie 4-sulcata, apicem versus subsparsim breviterque setosa, corpore 3.5–5 mm. longa, biaristata aristis retrorsum hamosis 0.5–1 mm. longis.

Type specimen: Collected by *John William Moore*, No. 559, at altitude of 300 meters, on ridge in wet clay soil, on mountain

at north side of Faaroa Bay, Island of Raritea, January 20, 1927 (Bish.).

Distribution: Island of Raritea, Society Islands.

Specimens examined: *Moore* 559 (type, Bish.).

In general habit simulating *B. polycephala*, from which it differs in achenial characters.

4. **Bidens Jardinii** Schz. Bip. Flora 39: 360. 1856. Pl. II.

Campylotheca Jardinii Schz. Bip. loc. cit.

Coreopsis Jardinii (Schz. Bip.) Drake del Cast. Ill. Fl. Ins. Mar. Pacif. 209. 1890.

Glabra, suffruticulosa, forsitan 6–10 dm. alta, ramis teretibus, repetito-trichotomis. Folia petiolata petiolis tenuibus ± 2.5 cm. longis, petiolo adjecto usque ad circ. 10 cm. longa, principalia lanceolata vel oblongo-lanceolata, apice moderate acuminata, basi abrupte angustata itaque late cuneata, marginibus eciliata sed multiserrata serraturis nempe unici folii omnino circ. 10 cm. longi utrinque numero 31, acumine et basi vero integra; folia superiora decrescentia, subrhomboideo-ovata, summa linearia. Capitula non numerosa, subcorymbosa, radiata, pansa ad anthesin ± 1.3 cm. lata et ± 6 mm. alta, pedicellis insidentia 2–6 cm. longis efoliatis vel foliolo uno alterove anguste lineari, 5–8 mm. longo, instructis. Involucrum depresso-hemisphaericum, demum circ. 5–7 mm. altum et 1–1.6 cm. latum, bracteis subaequilongis, exterioribus 6–8, oblongo-linearibus, glabris, apice obtusis, demum 4–5 mm. longis, interioribus lanceolatis nunc tergo minute pubescentibus et supra ciliolatis nunc glabratis; unico receptaculo circ. 4.8 mm. diametro metiente. Flores ligulati (forsitan 8?) aurei, ligula elliptico-oblongi, ±7 mm. longi. Achaenia anguste lineari-oblonga, obcompresso-tetragona vel obcompresso-triquetra, exalata, atra vel griseo-livida, omnino circ. 8- vel 9-sulcata, marginibus et costis medianis setis adrectis perspicue obsita, apice exaristata, circ. 4–5 mm. longa et circ. 0.7 mm. lata.

Type specimen: Collected by *Edelstan Jardin*, No. 41, on the Island of Nukahiva, Marquesas Islands (Par.).

Distribution: Island of Nukahiva, Marquesas Islands.

Specimens examined: *Jardin* 41 (type, Par.).

Related to *Bidens australis* Spreng. but differing in its exaristate achenes and fewer, mostly larger, and more corymbose heads; to *Bidens Mathewsii* Sherff, but differing in its shorter and exaristate achenes and smaller, more numerous heads. The original description by Schultz Bipontinus is here redrawn after careful study of his type.

EXPLANATION OF PLATE II

Bidens Jardinii: a, flowering and fruiting branch, ×0.65; *b,* exterior involucral bract, ×5.2; *c,* interior involucral bract, ×5.2; *d,* ray corolla, ×5.2; *e,* palea, ×5.2; *f,* achene, ×5.2; all from type.

5. **Bidens Bipontina** Sherff, Bot. Gaz. 85: 10. 1928.
Pl. XXXIII, figs. *m, n.*

Bidens serrulata Schz. Bip. Flora 39: 361. 1856; non *B. serrulata*[1] (Poir.). Desf. Tabl. Ecol. Bot. ed. 2. 130. 1815 (et Cat. Hort. Par. ed. 3. 186. 1829).

Coreopsis serrulata (Schz. Bip.) Benth. & Hook. ex Drake del Cast. Ill. Fl. Ins. Mar. Pacif. 210. 1890; cf. Fl. Polyn. Fr. 109. 1893; non *Coreopsis serrulata* Poir. Encycl. Supplem. 2: 352. 1811.

Campylotheca serrulata Schz. Bip. loc. cit. etiam ex Brown, Fl. S. E. Polynesia 3 (Bishop Mus. Bull. 130): 356, *fig. 64.* 1935.

Fruticosa, glabra. Folia petiolata petiolis tenuibus saepius 2–3 cm. longis, petiolo adjecto usque ad ± 11 cm. longa et ± 3.5 cm. lata, membranacea, lanceolata, apice perspicue acuminata, basi subacuta, subgrosse acriterque serrulata dentibus cuspidatis subinflexisque. Capitula pauca, corymbose disposita inflorescentia ± 7.5 cm. longa non exserta, radiata, pansa ad anthesin ± 7 mm. alta et ± 4 cm. lata. Involucri glabri vel subglabri bracteae exteriores circ. 5 vel 6, lineares, acutae, 5–6 mm. longae, basi ± 1 mm. latae; interiores ovatae, apiculatae, parce breviores. Flores ligulati 6–8, flavi, ligula oblongo-elliptici, circ. 2 cm. longi et ± 4.5 mm. lati. Paleae lineares, apice acutae, 6–7 mm. longae et ± 0.8 mm. latae. Achaenia anguste lineari-oblonga, valde obcompressa, exalata, griseo-livida vel apicem versus straminea, faciebus glabra vel supra sparsim longo-pilosa, marginibus valde piloso-ciliata pilis tenuibus albidis adrectis, corpore 6–7 mm. longa et 0.6–0.9 mm. lata, apice exaristata vel irregulariter 1- vel 2-aristata aristis minutis inutilibus calvis.

Type specimen: Collected by *Edelstan Jardin,* No. 132, on Island of Nukahiva, Marquesas Islands (Par.).

Distribution: Island of Nukahiva, Marquesas Islands.

Specimens examined: *Jardin* 132 (type, Par.); *E. H. Quayle* 1235, alt. 500 meters, Nukahiva, October 15, 1922 (Bish.).

Description, except as to achenes, drawn largely from *Quayle* 1235 (Bish.).

[1] The trivial name was misspelled *serrutata* at one point in Schultz Bipontinus' article. See discussion in the text.

The type sheet bears four entirely denuded branches (cf. "specimina valde manca," Schz. Bip. loc. cit.). A packet contains remnants of a fruiting head, with about a dozen achenes. From these I have drawn the above description of the achenes. No leaves remain, but Schultz Bipontinus described them as remotely and superficially serrate. The name unfortunately was misprinted *B. serrutata* in the original description. However, the correct spelling, *B. serrulata*, is found elsewhere in the original article of publication (op. cit. 356 et 362); also upon the type sheet, in Schultz Bipontinus' own handwriting.

EXPLANATION OF PLATE XXXIII, FIGS. *m*, *n*

Bidens Bipontina: m, n, achenes, ×6.4; both from type.

6. **Bidens collina** Deg. & Sherff ex Sherff, Bot. Gaz. 96: 144. 1934.

Campylotheca collina (Deg. & Sherff) F. Brown, Fl. S. E. Polynesia 3 (Bishop Mus. Bull. 130): 354. 1935.

Frutex erectus, gracilis, ramosus ramis obscurissime adpresso-setosis, circa 1 m. altus. Folia tenuiter petiolata petiolis saepius 1.5–2 cm. longis, petiolo adjecto 5–6 cm. longa et 1.5–3 cm. lata, indivisa, oblongo-lanceolata vel oblongo-ovata, rotundato-truncata vel fere subcordata, apice abrupte attenuata, membranacea, faciebus glabrata, marginibus acriter serrulata (unico latere 8–20-dentata). Capitula corymbose disposita, radiata, pansa ad anthesin 1.3–2 cm. lata et circ. 5 mm. alta. Involucri bracteae hispidae exteriores 5–8, lineares vel oblongae, apicem abrupte mucronulatum versus saepe dilatatae, 1.5–3 mm. longae, interioribus lanceolato-oblongis dimidio breviores. Flores ligulati plerumque 5 vel 6, flavi, ligula oblongi vel late oblanceolati, apice 2–3-denticulati, circ. 7–9 mm. longi. Achaenia submatura plana, lineari-oblonga, sursum sensim angustata, faciebus marginibusque perspicue erecto-setosa setis fulvescentibus, corpore sub 2.5 mm. longa et sub 0.8 mm. lata, apice erecte setosa setis pluribus (saepe 2 longioribus et aristis non dissimilibus).

Type specimen: Collected by *Adamson & Mumford*, No. 400, growing about 1 meter tall on exposed hillside at altitude of about 100 meters, Tehutu, Island of Hiva Oa, Marquesas Islands, May 19, 1929 (N.Y.).

Distribution: Island of Hiva Oa, Marquesas Islands.

Specimens examined: *Adamson & Mumford* 400 (type, N.Y.).

7. **Bidens Beckiana** (F. Brown) Sherff, comb. nov.

Campylotheca Beckiana F. Brown, Fl. S. E. Polynesia 3 (Bishop Mus. Bull. 130): 359, *fig. 66*. 1935.

Fruticosa vel subarborescens, altitudine ignota; ramulis dense patenterque crispo-pubescentibus, nodis erecte conferteque sordido-hispidis. Folia tenuiter petiolata petiolis patenti-pubescentibus 1.5–2 cm. longis basi non connatis, petiolo adjecto 5–7.5 cm. longa, membranacea, cordato-ovata, apice acuminato-acuta, utrinque minute molliterque pubescentia, margine minute minimeve serrulata (plerumque 10–12 dentulis per 1 cm.). Capitula ± 7 in inflorescentia terminali pubescenti folia vix superante disposita, radiata, pansa ad anthesin ± 2.5 cm. lata et ± 8 mm. alta. Involucri pubescentis bracteae exteriores ± 6, lanceolatae, ± 6 mm. longae et ± 2 mm. latae; interiores vix longiores, 1.5–2 mm. latae. Flores ligulati ± 8 mm. longi. Paleae lineares, apice acutae, 6–7 mm. longae et ± 0.5 mm. latae. Achaenia linearia, arcuata, exalata, perspicue hirsuta, exaristata, 4–6 mm. longa et 0.5–0.7 mm. lata.

Type specimen: Collected by *R. H. Beck*, No. 1529, on Island of Eiau, Marquesas Islands, September 20, 1922 (Bish.).

Distribution: Known only from type locality on Island of Eiau, Marquesas Islands.

Specimens examined: *Beck* 1529 (type, Bish.).

The description of the achenes is drawn from Brown's original text. Unfortunately Brown may have relied upon the several abortive and hence unrepresentative achenes (ovaries) at the periphery of the receptacle (the type at present completely lacks mature achenes).

8. **Bidens cordifolia** Schz. Bip. Flora 39: 361. 1856; Sherff, Bot. Gaz. 85: 24, *pl. 5, figs. h–n*. 1928. Pl. III, figs. *h–n*.

Campylotheca cordifolia Schz. Bip. loc. cit.

Coreopsis cordifolia (Schz. Bip.) Drake del Cast. Ill. Fl. Ins. Mar. Pacif. 208. 1890.

Frutex, ± 5 dm. altus, ramosus; ramis striatis, infra minutissime pubescentibus, supra dense tomentosis, oligocephalicis. Folia tenuiter petiolata petiolis 1.5–4.5 cm. longis, petiolo adjecto 6–10 cm. longa, 1.8–3.8 cm. lata, simplicia, ovato-oblonga, basi rotundata vel cordata, apice acuminata, margine eleganter serrata serraturis nempe ad latus singulum 25–40 vel etiam usque ad 60, supra sparsim pubescentia vel demum subglabrata, infra minute sed dense pubes-

BIDENS POLYCEPHALA Schz. Bip. (figs. *a–h*)
BIDENS AHNNEI Sherff (figs. *i–p*)

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centia; petiolis tomentoso-ciliatis vel demum inconspicue ciliatis. Capitula breviter pedunculata pedunculis circ. 2–4 cm. longis, radiata, pansa ad anthesin 1.5–2.5 cm. lata et ± 8 mm. alta. Involucri bracteae exteriores ovato-lanceolatae, acutae vel acuminatae, minute tomentosae, demum reflexae, circ. 7 mm. longae; interiores paulo breviores, late lanceolatae, minute plus minusve pubescentes. Flores ligulati circ. 10–12, flavi (?–ochroleuci in specimine sicco), ligula obovati vel cuneato-oblanceolati, irregulariter tridentati, tubulo adjecto circ. 9 mm. longi; paleis linearibus, demum 9–10 mm. longis. Achaenia linearia, tetragono-obcompressa, atra vel griseolivida, margine setis elongatis (interdum diametro achaenii multo longioribus) conferte praecipue apicem versus ciliata, una facie remote longo-pilosa, corpore exteriora 4–5 mm. interiora 6–8 mm. longa, omnia 0.5–0.65 mm. lata, apice longe pilosa et saepius aristis 2 minutis calvis vel retrorsum paucihamosis coronata.

Type specimen: Collected by *Edelstan Jardin*, No. 199, on the Island of Nukahiva, Marquesas Islands (Par.).

Distribution: Known only from Island of Nukahiva, Marquesas Islands.

Specimens examined: *Barclay* 3213, loam soil, wet ravines, Isl. Nukahiva, January, 1840 (Brit.); *Jardin* 199 (type, Par.).

EXPLANATION OF PLATE III, FIGS. *h–n*

Bidens cordifolia: h, flowering and fruiting branch, ×0.75; *i*, exterior involucral bract, ×3.75; *j*, interior involucral bract, ×3.75; *k*, ray corolla, ×3.75; *l*, palea, ×3.75; *m*, disc floret, ×6; *n*, achene, ×3.75; all from *Barclay* 3213, in Hb. Brit.

9. **Bidens hivoana** Deg. & Sherff ex Sherff, Bot. Gaz. 96: 143. 1934.

Frutex ramosus, glaber, ± 2 m. altus. Folia opposita, subconferte ad ramuli finem disposita, petiolata petiolis conduplicatis marginatis basi dilatato-connatis 1.5–3 cm. longis, petiolo adjecto circ. 6–8 cm. longa et 2.5–3.8 cm. lata, indivisa, ovata, basi rotundata vel raro vix subcordata, apice subacuta vel subattenuata, membranacea, obsolete ac remote serrulata, eciliata. Capitula terminaliter circ. 3-adgregata, pedunculata pedunculis suberectis glabratis ± 2.5 cm. longis, ut videtur radiata (ligulis in typo non plene cretis), disco ad anthesin circ. 6–7 mm. crasso et circ. 9–11 mm. alto. Involucri glabrati bracteae exteriores circ. 4, ovato-oblongae vel late lanceolatae, obtusae, usque ad 8 mm. longae, quam interiores oblongae paulo longiores. Flores ligulati (fide lectorum descriptionis) albi. Paleae angustissime lineares, usque ad 11 mm. longae. Achae-

nia submatura plana, oblanceolata vel obovata, atro-brunnea, glabra, apice bidentata dentibus glaberrimis deorsum in margines membranaceas luteo-brunneas alis similes desinentibus, corpore ± 5.5 mm. longa et marginibus alatis adjectis 2.3–3 mm. lata.

Type specimen: Collected by *Adamson & Mumford*, No. 469, growing 2 meters tall at altitude of 1,086 meters, in typical forest of cloud zone, on crest north of summit of Mt. Temetiu, Tenatinaei, Island of Hiva Oa, Marquesas Islands, July 24, 1929 (N.Y.).

Distribution: Marquesas Islands.

Specimens examined: *Adamson & Mumford* 469 (type, N.Y.).

10. **Bidens hendersonensis** Sherff, Bishop Mus. Occas. Paps. 12. No. 19: 6, *pl. 2*. 1937.

a. Capitula perpauca (± 3 ad rami apicem).....var. *β. oenoensis.*

a. Capitula numerosiora.

b. Capitula perspicue et subconferte in inflorescentia magna corymbiformi adgregata; foliorum laminis plerumque sub 5.5 cm. longis et 2–3 cm. latis...*B. hendersonensis* sensu stricto.

b. Capitula laxe disposita; foliorum laminis majoribus aut plus minusve subspathulatis.....var. *γ. subspathulata.*

Frutex arborescens ± 4 m. altus, glaber, caule inferne circ. 2.5 cm. crasso, cortice pallido-brunnea, ligno exteriore albo, medulla alba. Folia tenuiter petiolata petiolis 1–2.5 cm. longis, petiolo adjecto plerumque 5–8 cm. longa et 2–3 cm. lata, membranacea, oblongo-ovata, apice obtusa et breviter mucronata, basi late cuneata vel raro subrotundata, leviter serrata dentulis breviter cuspidatis. Capitula multa, laxe corymbosa pedicellis tenuibus glabris saepius 1–4 cm. longis, radiata, pansa ad anthesin tantum circ. 1 cm. lata et circ. 7 mm. alta. Involucri minute subsparsimque pubescentis bracteae exteriores 4–6, plus minusve oblongae, crassiusculae, apice subacutae, circ. 2–2.5 mm. longae; interiores oblongae, circ. 4–5 mm. longae. Flores ligulati circ. 5, flavi, ligula obovati, sub 5 mm. longi. Paleae lineares, apice acutae, demum usque ad 1.2 cm. longae. Achaenia anguste oblongo-linearia, obcompressa, nigra, utraque facie 4-sulcata et plerumque glabra, marginibus exalatis erecte setosa, corpore 7–10 mm. longa et circ. 1 mm. lata, apice biaristata aristis retrorsum hamosis ± 1 mm. longis.

Type specimen: Collected by *Harold St. John & Francis Raymond Fosberg*, No. 15107, at altitude of 33 meters, in jungle on elevated, dissected coral, north end of Henderson Island, Low Archipelago, June 17, 1934 (Bish., 2 sheets).

BIDENS JARDINII Schz. Bip.

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Distribution: Henderson (Elizabeth) Island, Low Archipelago (Tuamotu or Paumotu Islands).

Specimens examined: *St. John & Fosberg* 15107 (type, Bish., 2 sheets: cotypes, Berl.; Field, 2 sheets).

Bidens hendersonensis var. β. **oenoensis** Sherff, Bishop Mus. Occas. Paps. 12. No. 19: 7, *pl. 4*. 1937.

Fruticosa, decumbens erectave, 1–3 m. alta, caule basi circ. 2.5 cm. crasso. Folia tenuiter petiolata petiolis 1–3 cm. longis, petiolo adjecto plerumque 7–13 cm. longa et 3–5.3 cm. lata, membranaceissima, subpallida, oblongo-ovata, apice obtusa vel subacuta, basi late cuneata vel raro subrotundata, leviter dentata vel obsolete crenato-denticulata dentibus minute cuspidatis. Capitula pauca (saepius 3–5-adgregata), tenuiter pedunculata pedunculo glabro ± 4 cm. longo, pansa ad anthesin circ. 1.5 cm. lata et circ. 8 mm. alta. Involucri bracteae exteriores 8–10, oblongo-obovatae, apice acutae vel subacutae, glabratae vel minutissime glanduloso-pubescentes, 2–3 mm. longae; interiores oblonge ovatae, apice puberulentae, 4–6 mm. longae. Flores ligulati, ligula obovati, apice obscure denticulati, ± 6 mm. longi. Achaenia marginibus et saepe costa mediana erecto-setosa setis subflavidis, biaristata (vel obsoletissime triaristata) aristis erectis retrorsum hamosis ± 1.5 mm. longis.

Type specimen: Collected by *Harold St. John & Francis Raymond Fosberg*, No. 15183, under *Tournefortia* trees, at altitude of 2 meters, Island of Oeno, Low Archipelago, June 23, 1934 (Bish.).

Distribution: Island of Oeno, Low Archipelago (Tuamotu or Paumotu Islands).

Specimens examined: *St. John & Fosberg* 15183 (type, Bish.: cotypes, Berl.; Field, 2 sheets).

Bidens hendersonensis var. γ. **subspathulata** Sherff, Bishop Mus. Occas. Paps. 12. No. 19: 7, *pl. 3*. 1937.

Frutex 1.5–7 m. altus, interdum arborescens. Folia petiolo tenui 1–2.5 cm. longo adjecto plerumque 4–10 cm. longa, lamina diverse subspathulata (nunc plus minusve rhomboideo-oblonga, nunc rhomboide oblanceolata, nunc lanceolato-spathulata), apice subobtusa vel subacuta, basi late vel anguste cuneata, margine leviter pauciterque crenato-serrulata. Capitula laxius disposita. Achaenia confertius setosa.

Type specimen: Collected by *Harold St. John & Francis Raymond Fosberg*, No. 15173, bush 1.5 meters tall, open place in

jungle on elevated, dissected coral, at altitude of 30 meters, north center of Henderson Island, Low Archipelago, June 20, 1934 (Bish.).

Distribution: Henderson (Elizabeth) Island, Low Archipelago (Tuamotu or Paumotu Islands).

Specimens examined: *Harold St. John & Francis Raymond Fosberg* 15155, tree-like shrub, 3–7 meters tall, stem ± 4 cm. thick, bark gray, sapwood and pith white, common in jungle on elevated, dissected coral, alt. 30 meters, north center, Henderson Isl., June 20, 1934 (Bish.; Berl.; Field); *iidem* 15171, bush 2 meters tall, eodem loco et tempore (Bish.; Berl.; Field; Kew); *iidem* 15173 (type, Bish.: cotypes, Berl.; Field; Kew; U.S.).

11. **Bidens Lantanoides** A. Gray, Proc. Amer. Acad. 5: 128. 1861; Sherff, Bot. Gaz. 85: 24, *pl. 5, figs. a–g.* 1928. Pl. III, figs. *a–g.*

Frutex hirsutulo-pubescens, ramosus, ramis oligocephalicis. Folia petiolata petiolis 1–2 cm. longis, petiolo adjecto plerumque 4–6 cm. longa, simplicia, ovalia oblongave, apice acuta, basi late cuneata, margine creberrime serrata. Capitula solitaria pedunculos foliis subaequantes terminantia, radiata, pansa ad anthesin ± 2.2 cm. lata et ± 8 mm. alta. Involucri bracteae exteriores circ. 8–10, lineari-oblongae, disco adaequantes, circ. 6–8 mm. longae; interiores lanceolatae saepe paulo breviores. Flores ligulati flavidi, ligula elliptico-oblanceolati, apice paucidentati. Achaenia linearioblonga, subtetragona, omnino circ. 8-sulcata, brunneo-nigra, marginibus apiceque antrorsum hispidula, corpore circ. 8–10 mm. longa, biaristata aristis retrorsum hamosis, 0.5–1.5 mm. longis.

Type specimen: Collected by the *United States Southern Pacific Exploring Expedition* under *Captain Wilkes* on the Island of Eimeo (Morea), Society Islands, 1838–1842 (U.S.).

Distribution: Islands of Eimeo (Morea, Moorea) and Tahiti, Society Islands.

Specimens examined: *U. S. S. Pacif. Expl. Exped. (Capt. Wilkes)*, Tahiti, 1838–1842 (Gray); *eadem*, Eimeo (Morea), 1838–1842 (type, U.S.).

EXPLANATION OF PLATE III, FIGS. *a–g*

Bidens Lantanoides: a, fruiting branch, ×0.75; *b*, exterior involucral bract, ×3.75; *c*, interior involucral bract, ×3.75; *d*, ray corolla, ×3.75; *e*, palea, ×3.75; *f*, disc floret, ×6; *g*, achene, ×3.75; *a*, from type material in Hb. U.S.; *b–g*, from type material in Hb. Gray.

BIDENS LANTANOIDES Gray (figs. *a–g*)
BIDENS CORDIFOLIA Schz. Bip. (figs. *h–n*)

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12. **Bidens mooreensis** M. L. Grant, sp. nov.

Frutex ± 3.6 m. altus, multum ramosus, glaber, caule basaliter 4 cm. crasso; ramulis subteretibus. Folia opposita, petiolata petiolis subplanis sed non alatis 1.5–1.8 cm. longis, petiolo adjecto 6–9.5 cm. longa et 1.2–1.6 cm. lata, anguste oblongo-lanceolata vel elliptico-lanceolata, longe acuminata (acumine integro 1.4–1.8 cm. longo), apice extremo parce acria, basi cuneata vel subacuminata, margine acriter serrata 6–17 dentibus pro unico latere, utrinque pallido-viridia vel (sicca) supra demum subatra. Inflorescentia terminalis, corymboso-paniculata, patens, circ. 6 cm. alta et 9 cm. lata, exserta, glabra, saltem 10–20-cephala. Capitula radiata, pansa ad anthesin 1.5 cm. lata et circ. 6 mm. alta; pedicellis tenuissimis saepe 3–4 cm. longis. Involucri bracteae exteriores circ. 7 vel 8, lineares, apice dilatatae et subobtusae, circ. 3 mm. longae et 0.8 mm. latae, quam interiores lanceolatae paulo breviores. Folia ligulati 5, pallide flavi, ligula oblongi vel obovati, obsolete vel irregulariter 3-lobati, circ. 8 mm. longi. Paleae filiformes, ± 3.8 mm. longae et 0.3 mm. latae. Flores tubulosi 35–40, flavi, 5.5 mm. longi; ovario 1.2 mm. longo; corolla 3.8 mm. longa, tubuloso-campanulata, 5-lobata; filamentis 1.2 mm. longis; antheris 1.4 mm. longis, basi subacutis; styli ramis ovatis, acuminatis, extus pubescentibus; poculo nectarifero circum styli basim 0.3 mm. alto. Achaenia linearia, obcompressa vel subtetragona, nigra, exalata, marginibus plerumque antrorso-setosa, utraque 2 facierum 4-sulcata, corpore 3.8–4.8 mm. longa et circ. 0.6 mm. lata vix sub extremo apice biaristata aristis 0.4–0.5 mm. longis nudis vel pauciter retrorso-setosis.

Type specimen: Collected by *Martin Lawrence Grant*, No. 5386, at altitude of 350 meters, in ridge forest of *Crossostyles*, *Stenolobium*, *Xylosma*, and *Fagraea*, Putoa, District of Afareaitu, Island of Moorea, February 18, 1931 (Bish.).

Distribution: Island of Moorea (known variously also as Morea, Eimeo, Aimeo), Society Islands.

Specimens examined: *Grant* 5386 (type, Bish.).

Differs from perhaps its nearest ally, *B. australis*, in having fewer leaf serrations, larger heads, longer involucral bracts, and larger ray florets.

The description, as also the descriptions of three other species—16, *B. aoraiensis;* 19, *B. orofenensis;* and 27, *B. glandulifera*—was drawn from materials placed at my disposal by Dr. Martin L. Grant. Dr. Grant had made, during the course of graduate study at the

University of Minnesota, a detailed study of various species of *Bidens* found by himself and others in the Society Islands. He had recognized these four as new and very kindly contributed a copy of his manuscript to me for use in the present volume. It will be noted that *B. orofenensis*, several cotypes of which I had already studied independently while determining numerous specimens collected on the Bishop Museum's Mangarevan Expedition, has already been published elsewhere (Bish. Mus. Occas. Paps. 12. No. 19: 4, *pl. 1*. 1937).

13. **Bidens australis** Spreng. Syst. 3: 453. 1826. Pl. IV.

Coreopsis fruticosa Forst. Prodr. Fl. Ins. Austr. 91. 1786 (nomen; non Vest).

Campylotheca australis (Spreng.) Less. Linnaea 6: 509. 1831.

Bidens paniculata Hook. & Arn. Bot. Beech. Voy. 66. 1841.

Bidens fruticosa (Forst.) Schz. Bip. Flora 39: 358. 1856 (non L. nec DC.).

Coreopsis fruticosa Solander mss. in Seemann, Fl. Vitiensis 143. 1865–1868.

Suffruticosa, glabra, usque ad 3 m. alta; caule obtuse tetragono vel subtereti, erecto, ramoso vel saepe ramosissimo. Folia tenuiter petiolata petiolis 1–3 cm. longis, petiolo adjecto 6–13 (–24) cm. longa, indivisa, lanceolata oblongave et apice plerumque acuminata, serrata dentibus parvis et plerumque 20–40 (raro –75) in unico latere, non ciliata. Capitula parva, paniculato-corymbosa, supra folia exserta, minute radiata, pansa ad anthesin 6–7.5 mm. lata et 3–4 mm. alta, tenuissime pedunculata pedunculis 1–3 cm. longis. Involucrum vix hispidulum vel profecto saepe glabrum; bracteis exterioribus 5–7, minimis, linearibus, supra saepe dilatatis, apice plerumque subobtusis, raro subciliatis, circ. 1 mm. longis; interioribus lanceolatis, circ. 2 mm. longis. Flores ligulati circ. 5, minimi, ligula late ovati vel oblongi, apice plerumque denticulati, flavi, 2–3 mm. longi. Achaenia minuta, linearia, infra parce angustata, obcompresso-tetragona vel subplana, atra, sparsim suberecto-setosa, paleas saepe superantia, corpore 2.5–6.6 mm. longa, brevissime biaristata aristis divergentibus, retrorsum hamosis, 0.2–0.5 mm. longis.

Type specimen: Collected by *Johann Georg Adam Forster*, probably on Island of Tahiti (Par.; see discussion of type below).

Distribution: Islands of Eimeo (known also as Aimeo, Moorea, and Morea), Tahaa, and Tahiti (Society Isls.) and also Tonga (Friendly) Islands.

BIDENS AUSTRALIS Spreng.

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Specimens examined: *Banks & Solander*, Tahiti, 1769 (Brit.; U.S.); *iidem*, Tonga Isls. (Par.); *Beechey*, Tahiti (Kew); *Bertero & Moerenhout*, Tahiti, 1831 (Par.); *Bidwill*, Eimeo (Kew); *J. G. A. Forster*, Tahiti (Brit.; Par.); *G. T. Lay & A. Collie* (*Capt. Beechey's Voyage*), Tahiti, March–April, 1826 (Brit., 2 sheets); *Lepine* 98, Tahiti (Kew); *Moerenhout*, Tahiti, 1834 (Par.); *J. Nadeaud* 336, on precipices, Tahiti, June 1, 1857 (Par.); *Harold St. John* 17398, shrub 3 meters tall, in thicket on steep ridge, alt. 500 meters, east ridge, Mt. Purauti, Isl. Tahaa, October 11, 1934 (Bish.; Field; speciminibus sterilibus vel cum fructibus maturis sed nullis floribus); *Webb*, Tahiti (Kew).[1]

In 1769, Banks and Solander collected fine material of this species in the Society Islands (Tahiti, fide Solander in Seem. loc. cit.) and in the Tonga Islands. These collectors accompanied Captain Cook on the first of his three famous voyages (cf. Encycl. Brit. ed. 11. 3: 333. 1910). Further specimens were collected on Tahiti during Captain Cook's third voyage. Both sets of material are still extant in excellent condition (Brit.). A sheet from the first voyage (Society Islands) bears the name *Coreopsis fruticosa* mscr.[2] One from the third voyage bears the name *Coreopsis fruticosa* Soland. In Solander's unpublished manuscript, at the British Museum of Natural History, is his very complete and precise description of these plants under the name *Coreopsis fruticosa*. This description was not published until 1865–1868 (Seemann, loc. cit.).

Meanwhile, Forster, who was botanist on Captain Cook's third voyage (cf. Encycl. Brit. ed. 11. 10: 674. 1910), listed a *Coreopsis fruticosa* with the habitat "intra tropicos." He gave no description and so the name amounts, with him, merely to a nomen nudum. In fact, it seems entirely plausible that he meant merely to list a plant collected by him on Cook's third voyage and which he had found to match Solander's contemplated species that had been collected on Cook's first voyage. Forster's small and rather scanty private specimen went into the hands of Sprengel, who gave the first published description of it under the new name *Bidens australis*. This historic fragment later became the possession of Schultz Bipontinus, still later of E. Cosson, and now is in Paris. It agrees precisely with the

[1] Chamisso's specimens from Oahu, cited by Lessing (Linnaea 6: 509. 1831) for this species, are merely fragments with branchlets and leaves, but more or less deficient as to heads (Hll.; Kew). At Leningrad (Petrop.) they are slightly more ample than elsewhere and there display the simple-leaved state of *B. micrantha* (as exemplified by *Remy* 281).

[2] The Banks and Solander specimen at Paris is from the Tonga Islands (1769). It matches the Society Islands plants, but the label bears none of Solander's own notations.

material in London, already mentioned as having been collected likewise on Cook's third voyage. Schultz Bipontinus (loc. cit.) gave a very full description of Forster's fragment, evidently unaware of the much more ample duplicate material in London. Nor does he seem to have known of the synonymous *Bidens paniculata* Hook. & Arn., which was based on Captain Beechey's plant from Tahiti (Kew).

The five fruiting heads remaining on Forster's private fragment have achenes measuring, aristae included, about 3 mm. long (cf. Schz. Bip. loc. cit., "1 Linie lang, oder etwas länger"). Those on the duplicate material studied by Solander vary in length from 3 to 6 mm. (cf. Soland. in Seem. loc. cit., "bilinearia"). Those on the type of *B. paniculata* Hook. & Arn. average slightly smaller, varying from 2.5 to 3.9 mm. long, but this difference seems without much significance.

Asa Gray (Proc. Amer. Acad. 5: 128. 1861) erroneously associated this species with the Hawaiian *B. sandvicensis* Less. Drake (del Castillo, Ill. Fl. Ins. Mar. Pacif. 209–210. 1890) erroneously referred it to *B. Menziesii* (Gray) Sherff (*Coreopsis Menziesii* Gray), but he had already given a good picture of it under the name *Bidens paniculata* Hook. & Arn. (op. cit., *pl. 40.* 1888). From its general habit, also its much smaller and more numerous heads, it is seen to be affiliated more closely with such species as *B. polycephala* Schz. Bip. and *B. Ahnnei* Sherff, both of the southern Pacific, than with species such as *B. sandvicensis* Less. of the Hawaiian region. Nor does *B. australis* resemble at all closely *B. Lantanoides* Gray, which Seemann (loc. cit.) thought was "probably identical."

The plant is said by Mr. Collie to be mixed with coconut juice and boiled by the natives of Tahiti, to produce a cathartic. They know the plant as "motu" (Hook. & Arn., loc. cit.).

Additional material is much to be desired from the Island of Tahaa. One of the St. John specimens had been considered by Dr. Martin L. Grant, though somewhat doubtfully, as typifying a new species.

EXPLANATION OF PLATE IV

Bidens australis: a, flowering and fruiting branch, ×0.69; *b,* exterior involucral bract, ×13.7; *c,* interior involucral bract, ×13.7; *d,* ray corolla, ×10.3; *e,* palea, ×13.7; *f,* disc corolla, ×10.3; *g,* achene, ×6.86; all from *Capt. Beechey,* Tahiti (type of *B. paniculata* Hook. & Arn.), in Hb. Kew.

14. **Bidens raiateensis** J. W. Moore, Bish. Mus. Bull. 102: 47. 1933.

Suffruticosa, usque ad 1 m. alta; caule erecto, supra ramoso, glabro, subfusco, ramulis gracilibus glabris subviridibus. Folia tenuiter petiolata petiolis glabratis 5–15 mm. longis, petiolo adjecto 3.5–9.5 cm. longa et 1.5–2.5 cm. lata, simplicia, elliptico-oblonga vel obovata, apice acuta, basi cuneata, acriter dentata dentibus 2–5 mm. longis, membranacea, supra pilis acribus adpressis sparsissime instructa. Capitula in inflorescentia usque ad circ. 8 cm. longa terminali et in axillis foliorum superiorum subtabescente disposita, nunc pauca nunc numerosa, campanulata, radiata, pansa ad anthesin 1.2–2 cm. lata et circ. 8 mm. alta; pedicellis gracilibus, glabris, in axillis bractearum lanceolatarum acutarum 1–1.5 cm. longarum plerumque fictis. Involucri bracteae exteriores 5–8, subadpressae, spathulatae, apice subacutae, extus glabratae et supra virides infra subfulvae, intus inferne pilis subrubiginosis instructae, 6–10 mm. longae, quam interiores longiores. Flores ligulati 5 vel 6, subflavi, ligula oblongo-obovati, apice emarginati vel breviter 3-lobati, 7–10 mm. longi. Paleae ovato-oblongae, 7–8 mm. longae. Ovaria 2.75 mm. longa setis binis caducis 0.1 mm. longis instructa. Achaenia tenuiter linearia, irregulariter arcuata, subtetragona, exalata, nigra, apice subcapitato exaristata, facie quaque 2-sulcata, 8–10 mm. longa et tantum circ. 0.6 mm. crasso.

Type specimen: Collected by *John William Moore*, No. 467, at altitude of 450 meters, in wet clay soil, Mt. Temehani, Island of Raiatea, January 1, 1927 (Bish.).

Distribution: Island of Raiatea, Society Islands.

Specimens examined: *Martin L. Grant* 5195, alt. 411 meters, Temehani, District of Avera, January 29, 1931 (Minn.); *Moore* 467 (type, Bish.).

15. **Bidens Mathewsii** Sherff, Bot. Gaz. 81: 34. 1926. Pl. V.

Campylotheca Mathewsii (Sherff) F. Brown, Fl. S. E. Polynesia 3 (Bish. Mus. Bull. 130): 355. 1935.

Glabra, fruticosa, nunc extensa terra nunc forsitan 6–10 dm. alta, ramis angulatis. Folia tenuiter petiolata petiolis 1–2 cm. longis, petiolo adjecto 4–12 cm. longa et usque ad 4.7 cm. lata, indivisa, ovata vel lanceolata vel oblongo-lanceolata, membranacea, serrata dentibus parce mucronatis, eciliata, apice acuta. Capitula pauca (± 8 in unico ramo), corymbosa, in typo (sed non plerumque) supra folia

exserta, radiata, pansa ad anthesin ± 1.3 cm. lata et ± 0.8 cm. alta. Involucri bracteae exteriores 8–10, oblongo-lineares, glabratae, apice obtusae, 3–6 mm. longae, patentes vel reflexae; interiores lanceolatae, paulo longiores, apice et basim versus saepe minute pulverulentae. Flores ligulati ± 5, lutei, ligula elliptico-oblongi vel anguste obovati, apice plus minusve denticulati, ± 7 mm. longi. Achaenia paleis elongatis parce aequantia, plerumque anguste rarius late linearia, plana vel obcompresso-triquetra, exalata, atra, dense erecto-hispida pilis stramineis, corpore 5–8 mm. longa et 0.5–1 mm. lata, apice plerumque biaristata aristis retrorsum hamosis 0.5–1 mm. longis.

Type specimen: Collected by *Alexander Mathews*, No. 110, Pitcairn Island, March, 1830 (Kew).

Distribution: Known only from type locality, Pitcairn Island, in southern Pacific Ocean.

Specimens examined: *F. R. Fosberg & Roy Clark* 11276, spreading, leaves with parsnip odor, in rock crevices at top of cliffs, St. Paul's Point, June 14, 1934 (Berl.; Bish.; Field; Gray; Kew; U.S.; nom. indig. alehau); *Harold St. John* 15003, trailing shrub, on steep turfy slopes, summit of precipice above The Rope, alt. 200 meters, June 14, 1934 (Berl.; Bish.; Field; Kew; Mo.; N.Y.; foliis fragrantibus odore *Alyxiae olivaeformis* fide St. Johnii); *Mathews* 110 (type, Kew: cotype, Gray).

A plant with the foliage habit sometimes of *Bidens australis* Spreng., but having fewer and larger heads, more numerous and more uniformly linear (not apically dilated) exterior involucral bracts, and larger, much more hispid achenes.

EXPLANATION OF PLATE V

Bidens Mathewsii: a, flowering and fruiting branch, ×0.57; *b*, exterior involucral bract, ×4.56; *c*, interior involucral bract, ×4.56; *d*, ray corolla, ×4.56; *e*, palea, ×4.56; *f*, disc floret, ×4.56; *g*, achene, ×4.56; all from type.

16. **Bidens aoraiensis** M. L. Grant, sp. nov.

Frutex ± 2 m. altus, multum ramosus; ramulis subtetragonis, duabus faciebus (his oppositis) depressis tomentulosisque, internodiis 7–15 mm. longis. Folia ramulorum apices versus conferta, opposita, petiolata petiolis subplanis sed vix alatis 0.5–2 cm. longis, petiolo adjecto 4–8 cm. longa et 1.5–3 cm. lata, simplicia, glabra, ovata vel ovato-oblonga, apice acuta acuminataque, basi cuneata vel acuminata, acriter serrata (± 25 dentibus pro utroque latere), membranacea,

BIDENS MATHEWSII Sherff

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supra flavido-viridia, infra paulo pallidiora. Inflorescentia terminalis et in axillis superioribus disposita, corymboso-paniculata, circ. 5 cm. alta et 4 cm. lata, non exserta, pubescens, 10–20-cephala; pedunculis primariis tomentoso-sulcatis 0.5–2 cm. longis ultimis (pedicellis) 0.5–2 cm. longis et circ. 0.7 mm. crassis et inferne saepe paulum tomentellis. Capitula radiata, pansa ad anthesin circ. 12 mm. lata et 6–7 mm. alta. Involucri bracteae 3-seriales; extimae plerumque 6 vel 7, spathulato-oblongae (supra medium et basim versus dilatatae), puberulentae, tergo saepius 3-nervatae, apice subacutae, 3–4 mm. longae et circ. 1 mm. latae; medianae intimaeque apice ciliatae vel puberulentae, 4–6 mm. longae et circ. 1.8–2 mm. latae. Flores ligulati circ. 4, flavi, 3-denticulati, 7–9-nervii, ± 6 mm. longi et ± 1.8 mm. lati, corolla mature decidua. Paleae lineares, acutae, ± 4 mm. longae et ± 0.6 mm. latae. Disci flores circ. 35–40, flavi, ± 6 mm. longi; poculo nectarifero circum styli basim circ. 0.5 mm. alto. Achaenia linearia, obcompressa, nigra, exalata, duabus faciebus plus minusve obsolete 4-sulculata et interdum valde mediano-costata (itaque subtetragona), omnino et minutissime acri-papillata, marginibus interdum setosa, corpore 3.8–4.5 mm. longa et circ. 0.7 mm. lata, sub apice saepius aristata; 2 aristis retrorso-hispidis, aequalibus vel inaequalibus, usque ad 1–1.25 mm. longis.

Type specimen: Collected by *Martin Lawrence Grant*, No. 3794, at altitude of 2,063 meters, in scrub forest on summit of Mt. Aorai, District of Mahina, Tahiti, June 7, 1930 (Bish.).

Distribution: Tahiti, Society Islands.

Specimens examined: *Grant* 3794 (type, Bish.); *idem* 4419, alt. 1,015 meters, in *Metrosideros* forest, Mahina, Ahonu-Tuauru ridge, November 7, 1930 (Bish.).

An additional specimen is cited by Grant in his manuscript: *Quayle*, Mt. Aorai, Tahiti, August 1–3, 1922 (Bish.).

Differs from *B. australis* chiefly in the tomentose-channeled twigs and peduncles, the broader and shorter leaves, the larger and less numerous capitula, the longer exterior involucral bracts, and the larger ray corollas. Differs from *B. deltoidea* in the acuminate (not caudate) leaves with attenuate (not obtuse) bases, more numerous lateral nerves and glabrous (not ciliate) petioles, larger capitula, etc.

17. **Bidens Henryi** Sherff, Bot. Gaz. 76: 164. 1923; ibid. 85: 24, *pl. 2, figs. a–i.* 1928. Pl. VI, figs. *a–i.*

Campylotheca Henryi (Sherff) F. Brown, Fl. S. E. Polynesia 3 (Bish. Mus. Bull. 130): 355. 1935.

Fruticosa, glabra, ramosa, circ. 1 m. alta. Folia superiora (inferiora non vidi) in petiolum 1–3 cm. longum subcuneato-angustata, petiolo adjecto 5–11 cm. longa et 2–3 cm. lata, in specimine typico indivisa, ovato-lanceolata, satis acuminata, argute serrata 10–20 dentibus in unico latere, membranacea, non ciliata; inferiora majora ac cordiformia vel oblonga sed basi cordata. Capitula in nonnullis pedunculis ramum terminantibus et 5–6.5 cm. longis, pauca, pro patria magna, radiata, pansa ad anthesin 3.3–4 cm. lata et 8–10 mm. alta; disco demum circ. 12 mm. lato et 9 mm. alto. Involucrum glabrum vel basi parce hispidulum; bracteis exterioribus circ. 8, elongatis, linearibus, patentibus, plerumque subacutis, subeciliatis, 7–10 mm. longis et 0.6–1.2 mm. latis; interioribus oblongo-lanceolatis 5–7 mm. longis. Flores ligulati 5–8, ligula oblongo-elliptici, flavi, 9–14 striis percursi, apice parce denticulati, 1.2–1.9 cm. longi. Achaenia linearia vel lineari-oblonga, exalata, atra vel griseo-livida vel interdum ad terminos brunneo-straminea, faciebus glabra, marginibus glabra vel interdum supra adrecte 1–3-setosa; exteriora valde obcompresso-tetragona sed non vere alata, corpore 5–8 mm. alta et 1–1.6 mm. lata; interiora subtetragona, usque ad 1.1 cm. alta et circ. 1 mm. lata; omnia apice raro calva, saepius apice vel sub apice breviter 1–3-aristata aristis crassis, nudis vel obsoletissime suberecto-denticulatis, 0.3–1 mm. longis.

Type specimen: Collected by *Charles Henry*, arid region [at altitude of 1,050–1,200 meters], Atuona Valley Ridge on route to Hanamenu, Island of Hiva Oa, Marquesas Islands, December, 1917 (Field).

Distribution: Known only from type locality, Island of Hiva Oa, Marquesas Islands.

Specimens examined: *Forest B. H. Brown* 1084, alt. above 900 meters, Feani, December 15, 1921 (Bish.); *idem & Elizabeth D. W. Brown* 1018, alt. 800 meters, Ootua, eodem tempore (Bish.); *Charles Henry*, arid region, Atuona Valley Ridge, etc. (type, Field: cotype, Par., sub num. 14); *E. H. Quayle* 1600, alt. 800 meters, Hanaiapa, October 30, 1922 (Bish.).

EXPLANATION OF PLATE VI, FIGS. *a–i*

Bidens Henryi: a, flowering and fruiting branch, ×0.68; *b*, exterior involucral bract, ×4.08; *c*, interior involucral bract, ×4.08; *d*, ray corolla, ×2.72; *e*, palea, ×4.08; *f*, disc floret, ×4.08; *g*, *h*, *i*, achenes, ×4.08; all from type.

BIDENS HENRYI Sherff (figs. *a–i*)
BIDENS PULCHELLA (Less.) Schz. Bip. (figs. *j–p*)

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18. **Bidens glabrata** (Gray) Sherff, Bot. Gaz. 88: 292. 1929. Pl. VII.

Bidens Lantanoides var. (?) *glabrata* Gray, Proc. Amer. Acad. 5: 128. 1861.

Frutex, ramis subtetragonis, hinc inde hispidulis, minute striatis. Folia breviter ac late petiolata petiolis basaliter ciliatis circ. 1 cm. longis, petiolo adjecto 7–10 cm. longa et 2–3 cm. lata, oblonga, basi sensim attenuata apice subabrupte attenuata et breviter acuminata, lamina glabra, crassiuscula, acriter serrata unico latere 11–19 dentibus. Capitula corymboideo-paniculata, pedunculata pedunculis validis usque ad 8 cm. longis, verisimiliter radiata, involucris demum basi ± 7 mm. latis. Involucri bracteae exteriores circ. 7, late lineares, apice subobtusae, tergo non nisi basim versus pubescentes, circ. 4 mm. longae; interiores oblongo-lanceolatae, 6–7 mm. longae. Achaenia submatura brunnea, matura atra, valde obcompressa, linearia, nunc inferne nunc superne attenuata, glabra, exalata, unica facie circ. 4-sulcata, corpore 4–5 mm. longa et circ. 0.8 mm. lata, apice biaristata aristis tenuibus retrorsum hamosis usque ad 2.2 mm. longis.

Type specimen: Collected by the *United States Southern Pacific Exploring Expedition* under *Captain Wilkes* on Tahiti, Society Islands (U.S.).

Distribution: Known only from type locality, Tahiti, Society Islands.

Specimens examined: *U. S. S. Pacif. Expl. Exped.* under *Capt. Wilkes* (type, U.S.).

The description is drawn from the two small branches on the type sheet. These are somewhat fragmentary, yet quite sufficient to indicate an identity specifically distinct from all heretofore known Pacific species.

EXPLANATION OF PLATE VII

Bidens glabrata: a, remnant of flowering and fruiting branch, ×0.68; *b,* exterior involucral bract, ×5.44; *c,* interior involucral bract, ×5.44; *d* (young), *e* (older), achenes, ×5.44; all from type.

19. **Bidens orofenensis** M. L. Grant ex Sherff, Bishop Mus. Occas. Paps. 12. No. 19: 4. 1937.

Frutex ± 1 m. altus, caule basi ± 6 mm. crasso; ramulis crassis sub inflorescentia circ. 3 mm. diametro, tomentuloso-canaliculatis, brunneis. Folia petiolata petiolis alatis glabris 1–2 cm. longis, petiolo adjecto 10–13.5 cm. longa et 2–3 cm. lata, membranacea,

lanceolata vel elliptico-lanceolata, apice acriter acuminata, basi cuneato-acuminata, perspicue serrata (dentibus patentibus 10–26 pro utroque latere), glabra. Inflorescentia terminalis corymbiformis non vel pro parte parva exserta, pedunculis glabris 5–9 cm. longis. Capitula radiata, pansa ad anthesin 17–23 mm. lata et 7–10 mm. alta. Involucri bracteae exteriores circ. 7 vel 8, adpressae, oblonge lineares vel lineari-oblanceolatae, apice subacutae, tergo 3-nerviae, glabrae, 8–12 mm. longae et 2–2.5 mm. latae, quam interiores lanceolatae extus sparsim puberulentae intus apice tomentulosae manifeste longiores. Flores ligulati (fide lectorum) pauci, parvi, flavi. Paleae lineari-oblongae, ± 5.3 mm. longae et ± 1 mm. latae. Disci flores flavi, 7 mm. longi. Achaenia submatura oblonge linearia, basim versus angustata, plana vel costis medianis perspicuis subtetragona, dorsaliter (ut ventraliter) subobscure 4-sulculata, porriginosa, maxima ex parte griseo-atra, corpore circ. 4 mm. longa et 1–1.2 mm. lata, perspicue biaristata; aristis vix sub apice ortis, divergentibus, apicem versus retrorsum infra antrorsum vel subantrorsum brevissimi-barbatis, circ. 2 mm. longis.

Type specimen: Collected by *Harold St. John* and *Francis Raymond Fosberg*, No. 17068, at altitude of 2,020 meters, summit and shaded sides of steep ridge, south ridge of Mt. Orofena, Tahiti, September 24, 1934 (Bish.).

Distribution: Tahiti, Society Islands.

Specimens examined: *St. John & Fosberg* 17068 (type, Bish.: cotypes, Bish.; Field).

20. **Bidens hawaiensis** Gray, Proc. Amer. Acad. 5: 128. 1861.[1] Pl. VIII.

Campylotheca hawaiiensis (Gray) Hillebr. Fl. Haw. Isls. 211, 214. 1888.

Coreopsis hawaiiensis (Gray) Drake del Cast. Illustr. Fl. Ins. Mar. Pacif. 209. 1890.

Frutex herbaceus, glaberrimus, caule plerumque glaucescens, ± 7 dm. altus. Folia petiolata petiolis tenuibus 1.5–3.5 cm. longis, petiolo adjecto 8–12 cm. longa et 2.5–3.5 cm. lata, crassiuscula, interdum nitida, serrata, acuminata, plerumque indivisa, oblongo-lanceolata. Capitula vix numerosa, corymboso-paniculata, mediocria, radiata, pansa ad anthesin 5–8 mm. alta et circ. 2–2.5 cm. lata. Involucri bracteae exteriores 5–7, lineares, obtusae, glabrae vel hispidae, circ. 2–3 mm. longae, quam interiores minores. Flores ligulati

[1] Published as *B. hawaiensis* by Gray; trivial name later spelled *hawaiiensis* by some writers.

BIDENS GLABRATA (Gray) Sherff

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7–8, ligula anguste oblongi, flavi, ad apicem plus minusve denticulati, ± 1 cm. longi. Achaenia recta, anguste linearia, exalata, brunneo-nigra, corpore 8–11 mm. longa et 1–1.5 mm. lata, faciebus et marginibus glabra, sub apice nudo breviter biaristata aristis erectis et retrorsum barbatis, plerumque 1–2 mm. longis.

Type specimen: Collected by the *United States Southern Pacific Exploring Expedition* under *Captain Wilkes*, on the Island of Hawaii, Hawaiian Islands, 1840 (Gray).

Distribution: Islands of Maui (fide Hillebr. Fl. Haw. Isls. 214. 1888)[1] and Hawaii, Hawaiian Islands.

Specimens examined: *Ballieu* 46, Hawaiian Isls. (Par.); *William Hillebrand*, perhaps Isl. Hawaii (Berl.); *Macrae*, Mt. Kaah (Mauna Kea), Isl. Hawaii, June, 1825 (Gray); *U. S. S. Pacif. Expl. Exped.* (*Capt. Wilkes*), Isl. Hawaii, 1840 (type, Gray: cotypes, Mun.; Par.).

B. distans, a species from the Island of Lanai, was confused by me with this species in my conspectus of the species and varieties of *Bidens* native to islands of the central Pacific Ocean (Bot. Gaz. 85: 24. 1928).

In the Hawaiian Islands this and the other species of *Bidens* are known by the common name "kokoolau" (fide Degener, Ferns Flow. Pl. Hawaii Nat. Park 295. 1930).

EXPLANATION OF PLATE VIII

Bidens hawaiensis: a, flowering and fruiting branch, ×0.6; *b*, exterior involucral bract, ×4.8; *c*, interior involucral bract, ×5.6; *d*, ray corolla, ×3.6; *e*, palea, ×4.8; *f*, disc floret, ×5.2; *g*, *h*, achenes, ×3.6; *i*, fruiting head, ×1; all from type.

21. **Bidens distans** Sherff, Bot. Gaz. 89: 362. 1930. Pl. IX.

Frutex erectus, glaber, ramosus, verisimiliter 6–9 dm. altus, caule subtereti glaucescenti. Folia petiolata petiolis tenuibus 3–4.5 cm. longis, petiolo adjecto 9–16 cm. longa, nunc pinnatim 3–5-partita foliolis lanceolatis serratis dentibus acriter mucronatis, apice acutis sed parce acuminatis; nunc indivisa lamina lanceolata ± 11.5 cm. longa et ± 4 cm. lata, unico latere circ. 16–20 dentibus munita. Capitula paniculato-corymbosa, numerosa, subdense disposita (distantia) pedicellis tenuibus plerumque 1–2 cm. longis, radiata, pansa ad anthesin 1.5–2 cm. lata et circ. 6–7 mm. alta. Involucri bracteae exteriores 4–6, oblongo-lineares, obtusae, minimae (1–2 mm. longae), quam interiores lanceolatae multo minores. Flores ligulati plerum-

[1] Hillebrand's specimen from East Maui (Berl.) is of doubtful identity.

que 5, ligula anguste oblongi, flavi, apice plus minusve denticulati, 8–12 mm. longi. Achaenia recta vel vix curvata, anguste linearia, plana, exalata, atra vel ad apicem brunnea, utraque facie circ. 4-sulcata, corpore 8–11.5 mm. longa et 1.1–1.7 mm. lata, facie marginibusque glabra, apice interdum paucisetosa, sub apice irregulariter biaristata aristis erectis et retrorsum barbatis, usque ad 1 (rarius –3) mm. longis.

Type specimen: Collected by *Charles Noyes Forbes*, No. 148*L*, "at Gay's," on mountains near Koele,[1] Island of Lanai, Hawaiian Islands, June, 1918 (Field).

Distribution: Known only from Island of Lanai, Hawaiian Islands.

Specimens examined: *Forbes* 148*L* (type, Field: cotype, Bish.); *George C. Munro*, Kapano, Lanai, July 28, 1915 (Field); *Joseph F. Rock* 8008, south coast of Lanai, July 28, 1910 (Gray).

Differs from *B. hawaiensis* Gray in its smaller and more numerous heads, minute exterior involucral bracts, fewer rays, mostly divided leaves, etc. Differs from *B. micrantha* Gaud. in its more open inflorescence, dullish-black, not truly shining achenes, glaucescent stem, etc.

EXPLANATION OF PLATE IX

Bidens distans: a, flowering branch, ×0.55; *b*, *c*, compound leaves, ×0.55; *d*, exterior involucral bract, ×5.54; *e*, interior involucral bract, ×5.54; *f*, ray corolla, ×4.43; *g*, palea, ×3.88; *h*, disc floret, ×6.09; *i*, achene, ×3.32; *b*, from *G. C. Munro*, Kapano, July 28, 1915, in Hb. Field; rest from type.

22. **Bidens Degeneri** Sherff, Bot. Gaz. 85: 3. 1928.
Pl. X, figs. *i–o*.

Campylotheca dichotoma Hillebr. Fl. Haw. Isls. 212. 1888.

Coreopsis dichotoma (Hillebr.) Drake del Cast. Illustr. Fl. Ins. Mar. Pacif. 209. 1890.

Bidens dichotoma (Hillebr.) Sherff, Bot. Gaz. 70: 98. 1920; non *B. dichotoma* Desf. Tabl. ed. 1. 108. 1804 (nomen nudum); nec *B. dichotoma* Desf. Cat. Pl. Hort. Reg. Par. ed. 3. 185. 1829.

Multa folia indivisa.....*B. Degeneri* sensu stricto.

Folia plerumque 3-partita.....var. *β. Apioides*.

[1] Spelled Koala upon United States Geological Survey map. But a Mrs. Greenland (née Gay) informed *H. Wiebke* (fide *O. Degeneri* in lit., Feb. 9, 1928) that the name is spelled locally Koele, not Koala.

BIDENS HAWAIENSIS Gray

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Humilis, prostrata vel erecta, inferne lignea, superne herbacea, glabra, ramis brevibus saepe dichotomis et cymis veteribus annorum priorum in furcis, verisimiliter usque ad 4 dm. alta. Folia tenuiter petiolata petiolis 1–2.5 cm. longis, petiolo adjecto 2–6.5 cm. longa, parce carnosa, moderate serrata, nunc indivisa, ovata obovatave et breviter acuminata, nunc tripartita foliolis ovatis lanceolatisve basi rotundatis vel cuneatis. Capitula minima, plerumque numerosa, radiata, pansa ad anthesin 6–8 mm. lata et 4–5 mm. alta, in cymis minutis 3–5 (–poly) -cephalis disposita, pedunculis 2–5 cm. longis, pedicellis 2–20 mm. longis. Involucri bracteae exteriores 5–7, lineares, glabrae vel obscure glanduloso-hispidae, adpressae vel reflexo-patentes, 1–2 mm. longae, quam interiores lanceolatae plerumque breviores. Flores ligulati circ. 3 vel 4, lutei, ligula ovati vel elliptici, apice irregulariter plus minusve profunde incisi, circ. 4–5 mm. longi. Achaenia linearia, curvata vel torta, exalata, obcompressa vel subtetragona, subnigra, glabra vel supra sparsissime erecto-hispida, corpore 6–8 mm. longa et circ. 0.6–1 mm. lata, nunc biaristata aristis tenuibus circ. 1 mm. longis et apice retrorsum hamosis, nunc omnia exaristata, quam paleae breves multo longiora.

Type specimen: Collected by *William Hillebrand*, Waikapu ("above Maalaea or on Haleakala," fide Hillebr. loc. cit.), Island of Maui, Hawaiian Islands (Berl.).

Distribution: Islands of Oahu, Molokai, and Maui, Hawaiian Islands.

Specimens examined: *Otto Degener & Henry Wiebke* 2162, extremely common on arid, windswept, rocky sides at medium elevations, Pohakea Gulch, Maui, July 11, 1927 (Berl.; Field; Kew; Haw.); *iidem* 2179, arid, windswept ridge north of Pohakea Gulch, near Wailuku, Maui, July 23, 1927 (Berl.; Boiss.; Field, 8 sheets; Haw.; Kew; Mun.); *C. N. Forbes*, sea cliffs, Halawa Valley, Molokai, August, 1912 (Bish.); *idem* 1982*O*, Waimano Ridge, Oahu, October 27–30, 1914 (Bish.); *Gaudichaud* 220 pro parte and 221 pro parte, Hawaiian Isls., September–October, 1836 (Par.); *William Hillebrand*, Waikapu, Maui (Berl.; type); *H. Mann & W. T. Brigham* 450, mountains near Waikapu, Maui (Bish.; Gray).

The minute flowering heads are a distinguishing characteristic of *Bidens Degeneri*, also the low stature, the small leaves, and the often much thickened, ligneous stems. The achenes are less distinctive. *Mann & Brigham* 450, with which Hillebrand stated his type material to be "identical," has even the youngest achenes exaristate. The *Forbes* material from Oahu has the numerous small, immature

achenes likewise exaristate. Among the many hundreds of fruiting heads found upon the *Degener & Wiebke* material, however, several heads were observed to have the achenes mainly aristate.

B. Degeneri was named in honor of Otto Degener, formerly of the University of Hawaii, Honolulu.

Bidens Degeneri var. *β.* **Apioides** Sherff, loc. cit.

E specie foliis plerumque 3-partitis, grosse serratis vel dentatis vel etiam lobatis, foliolo terminali interdum subtripartito differt.

Type specimen: Collected by *Otto Degener & Henry Wiebke*, No. 2179*b*, windswept ridge, north of Pohakea Gulch, near Wailuku, Island of Maui, Hawaiian Islands, July 23, 1927 (Field).

Distribution: Known only from type locality, north of Pohakea Gulch, near Wailuku, Island of Maui, Hawaiian Islands.

Specimens examined: *Otto Degener & Henry Wiebke* 2179*b* (type, Field: cotype, Haw.).

Western Maui is connected with eastern Maui by a broad, sandy isthmus, Wailuku, which appears to be the real home of the species. Recently *Degener & Wiebke*, on finding many specimens of the species proper, their number 2179, growing near Wailuku, observed several bizarre plants which may be designated 2179*b*. Regarding these latter, Mr. Degener (in lit.) states: "Plants of this type are somewhat rare and grow intermingled with typical ones." The leaves have their leaflets deeply toothed or lobed and suggest in outline the leaves of common celery, *Apium graveolens* L., whence the varietal name *Apioides*.

EXPLANATION OF PLATE X, FIGS. *i–o*

Bidens Degeneri: i, flowering and fruiting branch, ×0.59; *j*, exterior involucral bract, ×5.88; *k*, interior involucral bract, ×5.88; *l*, ray corolla, ×5.88; *m*, palea, ×5.88; *n*, disc floret, ×5.88; *o*, achene, ×5.88; all from *Forbes* 1982*O* in Hb. Bish.

23. **Bidens asymmetrica** (Lévl.) Sherff, Bot. Gaz. 81: 49. 1926; ibid. 85: 25 and *pl. 3*, 1928. Pl. XI and Pl. XII, figs. *a–i*.

Bidens gracilis Nutt. Trans. Amer. Phil. Soc. ser. 2, 7: 368. 1841; Sherff, Bot. Gaz. 70: 105, *pl. 13, figs. a–i*. 1920; non Torr. Ann. Lyc. N. Y. 2: 215. 1828.

Campylotheca gracilis (Nutt.) Walp. Repert. Bot. Syst. 2: 618. 1843.

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Lipochaeta asymmetrica Lévl., Fedde Repert. Sp. Nov. 10: 122. 1912.[1]
Bidens halawana Deg. & Sherff ex Sherff, Bot. Gaz. 94: 589. 1933.

Herbacea vel demum fruticosa, gracilis, glabra, ramosa ramis saepe rubescentibus, verisimiliter 6–9 dm. alta; caule infra obsolete supra plus minusve acriter tetragono. Folia plerumque serrata vel etiam laciniato-dentata, nunc indivisa et ovata vel lanceolata, basi subcordata vel rotundata et saepius moderate asymmetrica, apice acuta vel acuminata, petiolis adjectis 3–13 cm. longa et 1–3.5 cm. lata; nunc tripartita, foliolis lanceolatis, foliolo terminali usque ad 4 cm. lato, lateralibus dimidio minoribus; petiolis tenuibus 1–6 cm. longis; raro foliis multo majoribus. Capitula parva, in inflorescentia composite bracteato-cymosa disposita, in ramulis solitaria vel bina, radiata, pansa ad anthesin 1–2 cm. lata et 5–7 mm. alta. Involucri bracteae exteriores 6–9, patulae, lineares, apicem versus subglandulosae, alibi glabrae, apice subacutae, circ. 4–5 mm. longae, quam interiores lanceolatae ad apicem saepe minutissime pubescentes paulo (vel interdum fere dimidio) breviores. Flores ligulati saepius 4, flavi, ligula late oblongo-oblanceolati, apice saepe obsolete 2–3-denticulati, 3–11 mm. longi. Achaenia plerumque plus minusve torta, oblongo-linearia, nunc infra nunc supra angustata, non vere alata, atro-brunnea, faciebus striata, glabra vel margine saepe 1–3 setis praedita, corpore 6–14 mm. longa et 0.8–1.5 mm. lata, nunc brevissime biaristata aristis 0.3–0.8 mm. longis et glabris vel apicem versus retrorsum hispidulis, nunc uniaristata vel etiam exaristata, saepe omnibus tribus formis in eodem capitulo.

Type specimen: Collected by *Abbé Urbain Faurie*, No. 960, Kalihi, Island of Oahu, Hawaiian Islands, October, 1909.[2]

Distribution: Island of Oahu, Hawaiian Islands.

Specimens examined: *William Bush & D. LeRoy Topping* 3765, shady bank, Pacific Heights Trail, October 14, 1934 (Field); *Christophersen, Wilder, & Hume* 1502, alt. 300–500 meters, open forest, head of Kalihi Valley, January 25, 1931 (Bish.; Field); *Otto Degener* 2096, dry, sunny ridge, Fort Shafter, Honolulu, October 22, 1922 (Field, 3 sheets); *idem* 10035, open woods, rim of Mt. Tantalus, November 12, 1935 (Field); *idem & Kwan Kee Park* 10066, eodem loco, November 20, 1935 (Field); *iidem, Yoshimasa Nitta, & William*

[1] Léveillé's original spelling was *asymetrica*, perhaps through influence of the French *asymetrique*. However, the universally accepted (New) Latin form calls for *asymmetrica*, which is here used in keeping with article 70 of the International Rules of Botanical Nomenclature (Revision of 1930).

[2] Type herbarium not cited by Léveillé. Specimens of *Faurie* 960 occur, however, in Hb. Brit., Hb. Del., and Hb. Par.

Bush 4133, on partly forested lateral ridge, north slope of South Halawa Gulch, about one mile from top of Koolau Range, April 17, 1932 (Berl.; Brit.; Field, 2 sheets; Gray; Kew; Mo.; N.Y.; type collection of *Bidens halawana* Deg. & Sherff); *Degener, Park, & Nitta* 4134, in forest, ridge on south slope of North Halawa Gulch, about 0.75 mile from No. 4133, April 17, 1932 (Berl.; Field; Gray; Kew; Mo.); *Degener, Park, & Takamoto* 10332, partly wooded ridge, C.C.C. Trail, Aiea, February 16, 1936 (Field, 2 sheets); *Degener, Park, Topping, Bush, & Potter* 10070, open rainy woods at Middle Halawa Ridge, May 26, 1935 (Field); *Degener, Park, & T. Yamamoto* 3237, in forest on plateau, about 2.5 miles northeast of main road above Forest Reserve fence, Red Hill, October 9, 1932 (Berl.; Brit.; Del.; Field; Goth.; Gray; Kew; Mo.; Mun.; N.Y.; Par.; U.S.); *iidem* 4236, in thick, tall grass near summit of ridge, about 2 miles northeast of main road just below Forest Reserve fence, Red Hill, October 9, 1932 (Berl.; Brit.; Del.; Field; Goth.; Gray; Kew; Mo.; N.Y.; Par.; U.S.); *Faurie* 960 (type collection; Brit.; Del.; Par.); *C. N. Forbes* 1184*O*, Moanalua Valley, March 9, 1909 (Bish.); *F. R. Fosberg & Harold St. John* 9343, alt. 460 meters, in wet forest, Kalauao-Waimalu Ridge, Koolau Mts., March 29, 1933 (Berl.; Field, 2 sheets; Goth.; Gray; Mo.); *William Hillebrand*, Nuuanu (Berl., 2 sheets, sub nom. *Campylotheca macrocarpa* et var. β.); *idem* 35, Oahu (Kew); *Mann & Brigham* 98 pro parte, Oahu (Brit.; Corn.; Del., cum *B. macrocarpa* commixt.; Field; Mo.; U.S.); *Archibald Menzies*, Hawaiian Isls. (Brit.); *Thomas Nuttall*, Oahu (Brit.; type of *B. gracilis* Nutt.); *Harold St. John* 11181, shrub 3 ft. tall, alt. 510 meters, wooded ridge, main ridge running southwest from Puu Lanihuli, Kalihi-Nuuanu, November 29, 1931 (Field); *D. LeRoy Topping* 3834, dry, sunny bank, along new C.C.C. Trail, Aiea, September 22, 1935 (Field); *idem & Colin Potter* (*Degener* distrib. No.) 10037, middle Halawa Ridge, Nov. 10, 1935 (Field).

Until recently, no botanist appears to have given this species serious attention. In 1843, Walper categorically transferred it along with two others described by Nuttall from *Bidens* to *Campylotheca*. In 1861, Gray (Proc. Amer. Acad. 5: 128) referred it, with *Bidens mutica* Nutt., to *B. sandvicensis* Less. Nuttall's types of *B. gracilis* and *B. mutica* are still extant in a state of excellent preservation (Brit.). The type of *B. gracilis* is clearly distinct from that of *B. mutica*. It is distinct also from the type specimen of *B. sandvicensis* Less. (Berl.). In 1888, Hillebrand doubtfully referred the species to a variety of *B. macrocarpa*, but Nuttall's type is not even remotely matched by the type material (U.S.; Gray; N.Y.) of *B. macrocarpa*.

BIDENS MICRANTHA Gaud. (figs. *a–h*)
BIDENS DEGENERI Sherff (figs. *i–o*)

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It is, however, the same as *Mann & Brigham* 98, wrongly distributed to various herbaria as *B. hawaiensis*. *B. hawaiensis* is a much coarser plant and differs in many characters from Nuttall's *B. gracilis*.

The type material of *Lipochaeta asymmetrica* Lévl. is found to be a coarser and more herbaceous form, inseparable in technical characters from this species.[1] The trivial name *asymmetrica* is here taken up because of the homonym *Bidens gracilis* Torr.

EXPLANATION OF PLATE XI

Bidens asymmetrica: a, flowering and fruiting branch, ×0.6; *b*, tripartite leaf, ×0.6; *c*, exterior involucral bract, ×3.6; *d*, interior involucral bract, ×3.6; *e*, ray corolla, ×3.6; *f*, palea, ×3.6; *g*, disc floret, ×3.6; *h*, *i*, achenes, ×3.6; all from type or cotype material in Hb. Del. and Hb. Brit.

EXPLANATION OF PLATE XII, FIGS. *a–i*

Bidens asymmetrica: a, flowering and fruiting branch, ×0.63; *b*, tripartite leaf, ×0.63; *c*, exterior involucral bract, ×6.3; *d*, interior involucral bract, ×6.3; *e*, ray corolla, ×6.3; *f*, palea, ×6.3; *g*, disc floret, ×6.3; *h*, *i*, achenes, ×6.3; *b*, from *Forbes* 1184*O* in Hb. Bish.; rest from *Mann & Brigham* 98, ibid.

24. **Bidens cervicata** Sherff, Bot. Gaz. 70: 99. 1920.
Pl. XIII, figs. *h–p*.

Glabra, supra herbacea, infra forsan suffruticosa; caule acute tetragono, ramoso, ± 8 dm. alto. Folia membranacea, pinnata vel summa tripartita, petiolata petiolis tenuibus 1.5–4 cm. longis, petiolo adjecto 7–15 cm. longa, foliolis lanceolatis, acuminatis, serratis (dentibus acribus et tenuiter mucronatis), sparsim ciliatis, 2.5–9 cm. longis et 0.8–2.8 cm. latis. Capitula multa, subcorymbosa, radiata, pansa ad anthesin 1.5–1.8 cm. lata et 5–7 mm. alta. Involucri bracteae exteriores plerumque 5, lineares, glabratae, patentes vel reflexae, 1.5–2.5 mm. longae, interioribus multo breviores. Flores ligulati circ. 5, flavidi, ligula ovato-lanceolati vel elliptico-oblongi, apice saepe profunde et acriter dentati, 7–9 mm. longi. Achaenia tenuiter linearia, nigra, exalata, exaristata, glabra vel 1-paucis setis munita, torta, infra angustata, supra cervici-elongata, 1–1.3 cm. longa.

Type specimen: Collected by *Charles Noyes Forbes*, No. 1085*K* pro parte, in Waimea Drainage Basin, west side, Island of Kauai, Hawaiian Islands, July 3–August 18, 1917 (Bish.).

[1] The herbaceous form, with large, mainly simple leaves, is the plant had in mind by Hillebrand (excl. syn. *B. sandvicensis* var. *ovatifolia* Gray) for his *Campylotheca macrocarpa* var. β. (Fl. Haw. Isls. 215. 1888).

Distribution: Known only from type locality, Waimea Drainage Basin, Island of Kauai, Hawaiian Islands.

Specimens examined: *Forbes* 1085*K* pro parte (type, Bish., cum *B. Cosmoidi* commixt.).

EXPLANATION OF PLATE XIII, FIGS. *h–p*

Bidens cervicata: h, flowering and fruiting branch, ×0.54; *i,* one of larger leaves, ×0.54; *j,* exterior involucral bract, ×5.43; *k,* interior involucral bract, ×5.43; *l,* ray corolla, ×3.26; *m,* palea, ×5.43; *n,* disc floret, ×3.26; *o, p,* achenes, ×3.26; *i,* from cotype in Hb. Field; rest from type.

25. **Bidens graciloides** Sherff, Bot. Gaz. 76: 159. 1923.
Pl. XIV, figs. *a–g.*

Glabra, erecta vel repens, fruticosa, ramosa (ramis moderate tetragonis) vel infra simplex, 1–6 dm. alta. Folia tenuiter petiolata petiolis 1–3 cm. longis, petiolo adjecto 3–6 cm. longa, nunc indivisa et ovata, nunc pinnata vel rarius subbipinnata, foliolis 3 vel 5 (vel rarius 7) ovatis vel ovato-lanceolatis, crenato-serratis, apice obtusis vel acutis, 0.4–2 cm. latis. Capitula laxe subcorymbosa, non plerumque supra folia perspicue exserta, tenuiter pedunculata pedunculis usque ad 6 cm. longis, radiata, pansa ad anthesin 1.1–1.5 cm. lata et 5–7 mm. alta. Involucri bracteae exteriores 4–6, lineares vel oblongo-lineares, apice obtusae vel acutae, nunc hispidae nunc fere glabrae, 2–3 mm. longae; interiores lanceolatae, dimidio longiores. Flores ligulati 4–5, flavi, ligula elliptici, apice dentati, 5–7 mm. longi. Achaenia atra, plus minusve arcuata, plana, non vere alata, linearia, marginibus et saepe costis medianis sparsim setosa, unica facie circ. 4-striata, corpore 4–8 mm. longa et 0.6–1 mm. lata, nunc exaristata, nunc biaristata aristis tenuibus retrorsum hamosis, usque ad 1.5 mm. longis.

Type specimen: Collected by *Charles Noyes Forbes,* No. 2435*O,* ridge, right-hand side, Waialae Iki, Island of Oahu, Hawaiian Islands, March 2, 1917 (Bish.).

Distribution: Island of Oahu, Hawaiian Islands.

Specimens examined: *William Bush* 27, alt. 540 meters, grassy slopes, Manoa Cliffs, Tantalus, June 11, 1929 (Field); *Otto Degener* 2264, cliffs at wet head of Kuliouou Valley, December 11, 1927 (Berl.; Boiss.; Field; Haw.; Kew); *idem* 2265, arid, sunny slope at base of Kuliouou Valley, December 11, 1927 (Berl.; Field, 3 sheets; Haw.; Kew); *idem, K. K. Park & W. Hirai* 4040, east ridge of Niu Valley,

BIDENS ASYMMETRICA (Lévl.) Sherff

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summit of ridge at edge of forest, April 20, 1931 (Field); *iidem* 4041, eodem loco et tempore, dry, grassy slope before reaching forest (Berl.; Field; Gray; Kew; Mo.); *iidem* 4045, east ridge of Kuliouou Valley, May 3, 1931 (Berl.; Boiss.; Brit.; Field; Gray; Kew; Mo.; Mun.; N.Y.; Par.; U.S.); *Degener, Park, & Nitta* 4160, sunny, grassy slope, middle ridge of Niu Valley, June 4, 1932 (Berl.; Boiss.; Calif.; Field; Gray; Kew; Mo.; Mun.; N.Y.; Par.; U.S.; U.V.); *Forbes* 1862*O*, Oahu, December 11, 1913 (Bish.); *idem* 2435*O* (type, Bish.); *idem* 2474*O* et 2477*O*, between Niu and Wailupe, April 11, 1917 (Bish.); *A. A. Heller* 1988 p.p., Nuuanu, March 23, 1895 (N.Y.); *D. Le Roy Topping* 3304, alt. 300 meters, open ridge, Niu Ridge, January 13, 1929 (Berl.; Boiss.; Brit.; Field, 2 sheets; Kew; N.Y.).

At times simulated by depauperate forms of *B. sandvicensis*.

EXPLANATION OF PLATE XIV, FIGS. *a–g*

Bidens graciloides: a, flowering and fruiting branch, ×0.67; *b*, exterior involucral bract, ×6.67; *c*, interior involucral bract, ×6.67; *d*, ray corolla, ×4; *e*, palea, ×6.67; *f*, disc floret, ×6.67; *g*, achene, ×4; all from type.

26. **Bidens ctenophylla** Sherff, Bot. Gaz. 85: 5. 1928. Pl. XV and Pl. XVI.

Bidens schizoglossa Sherff, op. cit. 88: 288 and *pl. 19*. 1929.

Frutex ramosus ramis rubescentibus subtetragonis vix glaucescentibus glabratis, 1.2–1.5 (rarius –2.7) m. altus. Folia petiolata petiolis tenuibus 2–5 cm. longis, petiolo adjecto 5–12 cm. longa, membranacea, nunc simplicia, basim integram versus rotundata vel late cuneata, supra medium raro integra plerumque perspicue pectinato-dentata dentibus (in unico latere saepius 3–9) plerumque prorsum spectantibus, apice acuminata, circumambitu ovata vel rhomboideo-ovata, margine debiliter ciliata, supra glabrata, infra saepe paucis setis sparsissime adpresso-hispida; nunc 1–2-pinnata, foliolis lanceolatis vel lineari-lanceolatis integris vel plus minusve pectinato-dentatis, lateralibus minoribus. Capitula numerosa, in inflorescentia corymbiformi vel paniculata disposita, radiata, pansa ad anthesin 4–6 mm. alta et circ. 1.5–1.8 cm. lata; pedicellis et pedunculis minimis dense et insigniter albido-pubescentibus. Involucri bracteae dense hispidae, exteriores 5–8, lineares, patentes, apice acutae, 1.5–2.5 mm. longae; interiores lanceolatae, dimidio longiores. Flores ligulati plerumque 5, ligula late lineari-oblongi vel obovati, flavi, apice rotundato integri vel etiam acriter denticulati vel profunde lobati, 7–10 mm. longi. Achaenia demum paleas anguste

lineares paulo superantia, recta vel subrecta, sublate oblongo-linearia, valde obcompressa, corpore nigro 8–11 mm. longa et 1.5–2 mm. lata, faciebus marginibusque glabra, apice (saepe imperfecte) biaristata; aristis usque ad 1.2 mm. longis, in achaeniorum duos subalatos stramineos margines decurrentibus, retrorsum barbatis vel demum plus minusve calvis.

Type specimen: Collected by *Otto Degener* and *Henry Wiebke*, No. 2128, arid, weed-covered "aa"[1] slopes, between Puuwaawaa and Huehue, Island of Hawaii, Hawaiian Islands, August 22, 1926 (Field, 2 sheets).

Distribution: Known only from type locality on Island of Hawaii, Hawaiian Islands.

Specimens examined: *A. Borges* (*Degener* distrib. No.) 3799, Huehue, November 26, 1929 (Field); *Degener & Wiebke* 2128 (type, Field, 2 sheets: cotypes, Berl.; Brit.; Haw.; Kew; Par., etc.); *Degener & Yasuma Iwasaki* 3813, usually 4 to rarely 6 feet high, on arid "aa" lava flows[1] near type locality north of Huehue, January 18, 1930 (Berl.; Boiss.; Brit.; Field, 3 sheets; Gray; Kew; Mo.; Mun.); *iidem* 3814, usually 5 to rarely 9 feet high, on extremely arid and hot lava flows along road west of Puuwaawaa, eodem tempore (Berl.; Boiss.; Brit.; Field, 3 sheets; Gray; Mo.); *Alfred Meebold* (*Degener* distrib. No.) 4168, Huehue, May 22, 1932 (Berl.; Field; Kew); *idem* 20821, Puuwaawaa, November, 1935 (Field); *William A. & C. B. Setchell*, near Huehue, June 24, 1924 (Calif.; type of *B. schizoglossa* Sherff); *Carl Skottsberg* 1954, 1955, and 1955*b*, along the Kona-Kohala Road in North Kona, near branch road to Puuwaawaa (Goth.).

EXPLANATION OF PLATE XV

Bidens ctenophylla: a, flowering and fruiting branch, ×0.59; *b*, portion of pedicel, ×6; *c*, exterior involucral bract, ×3.54; *d*, interior involucral bract, ×3.54; *e*, ray corolla, ×2.37; *f*, palea, ×3.54; *g*, disc floret, ×3.54; *h*, achene, ×3.54; *a*, mainly from cotype in Hb. Kew; rest from cotype in Hb. Field.

EXPLANATION OF PLATE XVI

Bidens ctenophylla: a, flowering and fruiting branch, ×0.64; *b*, exterior involucral bract, ×6.36; *c*, interior involucral bract, ×6.36; *d*, *e*, ray corollas, ×6.36; *f*, palea, ×6.36; *g*, disc floret, ×6.36; *h*, *i*, achenes, ×6.36; all from type of *Bidens schizoglossa* Sherff.

[1] Aa, Anglicized from the Hawaiian and meaning a loose, rough type of lava (fide Degeneri in lit.; cf. Degener, Plants Haw. Nat. Park. v. 1930).

27. **Bidens glandulifera** M. L. Grant, sp. nov.

Frutex ± 1.7 m. altus; ramulis gracilibus, lateribus plus minusve canaliculatis, glabris vel axillis subporrigini-tomentulosis. Folia subsparsim disposita, opposita, petiolata petiolis tenuibus subplanis glabris vel facie superiore tomentulosis, petiolo adjecto 4.5–6 cm. longa et ± 2.3 cm. lata, simplicia, membranacea, apice subabrupte acuminata, basi lato-cuneata vel subrotundata, marginibus acriter serrata (dentibus pro unico latere plerumque 15–20, nitide indurato-apiculatis), subflavido-viridia, infra vix pallidiora, lamina glabra vel glabrata. Inflorescentia terminalis et in axillis superioribus disposita, corymboso-paniculata, circ. 5 cm. alta et aequaliter lata, exserta, usque ad 20-cephala; pedunculis ultimis (pedicellis) sparsim puberulentis. Capitula radiata, pansa ad anthesin ± 11 mm. lata et ± 8 mm. alta. Involucri basaliter puberulenti vel rarius glabrati bracteae exteriores circ. 8, spathulate lineari-oblanceolatae, apice subacuta 5–6 mm. longae et circ. 1 mm. latae; interiores lanceolatae, circ. 7 mm. longae et ± 1.7 mm. latae. Flores ligulati 5 vel 6, flavi sed venis forsitan rubro-brunnei, obscure 3–5-denticulati, 8- vel 9-nervii, ligula obovati, circ. 6.5 mm. longi. Paleae lineares, 4–7 mm. longae. Flores tubulosi circ. 30–35, flavi, circ. 6.6 mm. longi, poculo nectarifero circum styli basim circ. 0.5 mm. alto. Achaenia linearia, plana et bimarginata vel interdum trigona et trimarginata, maximam partem subatra lateribus apiceque flavido-brunnea, utraque facie glabra et plerumque 4-sulculata, marginibus supra medium antrorsum apicem versus retrorsum brevi-setulosa, corpore 7.5–9 mm. longa et circ. 1.5 mm. lata, marginibus superne productis bi- (vel tri-) aristata (aristis sub apice ipso ortis, retrorsum setosis, sub 1 mm. longis); summo corpore glabro vel 1- vel 2-setoso.

Type specimen: Collected by *Martin Lawrence Grant*, No. 4958, at altitude of 530 meters, in ridge scrub, Tahuhuura, Mt. Tarapaia, District of Tevaitapu, Island of Borabora, January 3, 1931 (Bish.).

Distribution: Island of Borabora, Society Islands.

Specimens examined: *Grant* 4958 (type, Bish.).

Dr. Grant notes in his manuscript: "Serrations, margins of petioles, and occasionally twigs and lower surfaces of midribs with minute, sessile, callus-like, castaneous glands." These are, however, comparatively inconspicuous.

28. **Bidens macrocarpa** (Gray) Sherff, Bot. Gaz. 70: 97. 1920.
Pl. XVII, figs. *a–i*.

Coreopsis (*Campylotheca*) *macrocarpa* Gray, Proc. Amer. Acad. 5: 126. 1861.

Folia principalia ternata vel pinnata 3–5 foliolis.
B. macrocarpa sensu stricto.

Folia simplicia.....var. *β. ovatifolia.*

Fruticosa, erecta, glabra, 1–2.4 m. alta. Folia petiolata petiolis tenuibus 2–10 cm. longis, petiolo adjecto 0.5–2.2 dm. longa, subcrassa, ternata vel pinnata vel summa saepe pro maxima parte simplicia et inferiora plus minusve bipinnata; foliolis (3–5) ovatis vel ovato-lanceolatis, cuspidatis, acriter et saepe creberrime serratis (dentibus interdum valde inflexis), parce membranaceis, lateralibus 2–6 cm. longis et 1–2 cm. latis (imis interdum bipartitis vel etiam tripartitis), terminali majore saepius acuminato interdum tripartito, petiolulis lateralium plerumque 2–15 mm. longis. Inflorescentia laxa, aperta, foliolis linearibus vestita, folia superans. Capitula non numerosa, non minuta, radiata, pansa ad anthesin 7–8 mm. alta et circ. 3 cm. lata. Involucri bracteae subaequales, exteriores 5–7, crassae, late lineares, glabrae, circ. 6 mm. longae. Flores ligulati 5–7, flavi, ligula anguste vel late elliptico-oblongi, apice trifidi, 1–1.6 cm. longi; disci floribus 15–20. Achaenia pro capitulo magna, late linearia, plana, striata, brunnea vel atro-brunnea, glaberrima vel marginibus et apice setulosa, erecta vel subtorta, corpore 1.2–2 cm. longa et (ullis alis adjectis) 1.5–2.8 mm. lata, exalata vel alata, alis in duos dentes vel aristas sub corporis apice productis; aristis remotissime et minutissime, antrorsum retrorsumque barbatis, vel raro glabratis.

Type specimen: Collected by the *United States Southern Pacific Exploring Expedition* under *Captain Wilkes*, Island of Oahu, Hawaiian Islands, 1840 (U.S.).

Distribution: Known only from the Island of Oahu, Hawaiian Islands.

Specimens examined: *E. H. Bryan, Jr.*, 847, shrub 2 meters tall, alt. 690 meters, moist ridge in rain forest, Kaluanui, October 14, 1934 (Field); *William Bush* 25, alt. 600 meters, wind-swept, wet slope, Wahiawa-Kahana Divide, June 9, 1929 (Field; Gray; Kew; N.Y.; U.S.); *idem & D. L. Topping* 3779 et 3780, shady bank, C.C.C. Trail, Waipio, March 10, 1935 (Field); *Otto Degener*, open forest, near Pauoa Flats, Mt. Tantalus, April 18, 1926 (N.Y.); *idem* 2674, wooded, moderately dry slope, about halfway along lower trail from Pauoa Flats to Mt. Olympus, February 25, 1928 (Field; N.Y.); *idem* 2675, eodem loco et tempore, more shaded than No. 2674 (Field); *idem & K. K. Park* 4082, growing rarely up to 8 ft. high, locally common in rain forest, just south of summit of Puu Lanipo on Wilhelmina Rise Ridge, November 11, 1931 (Berl.; Brit.; Calif.;

BIDENS ASYMMETRICA (Lévl.) Sherff (figs. *a–i*)
BIDENS CUNEATA Sherff (figs. *j–p*)

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Del.; Field, 2 sheets; Gray; Kew; Mo.; N.Y.; Par.; U.S.; U.V.); *iidem & W. Hirai* 4043, wind-swept mountain summit, about halfway along Waikane-Schofield Trail, April 4, 1931 (Berl.; Boiss.; Field; Gray; Kew; Mo.; Par.); *Degener, Park, Potter, Bush, & Topping* 10071, near summit, Poamoho Trail, Laie, August 18, 1935 (Field); *iidem* 10072, open forest, Waimano, June 9, 1935 (Field; forma monstrosa); *iidem* 10073, near 4-mile post, Kipapa Trail, Koolau Range, June 21, 1935 (Field); *Degener, Takamoto, & Martinez* 10540, open rain forest near summit, C.C.C. Trail, Aiea, March 15, 1936 (Field); *Urbain Faurie* 996, Panalieu, May, 1910 (Brit.); *C. N. Forbes,* Lanihuli Trail, October 14, 1908 (Bish.); *idem,* Palolo Valley Ridges, December 17, 1908 (Bish.); *idem* 2221*O*, Waihiawa-Kahana Trail, August 17–20, 1915 (Bish.); *idem* (*& Labouchere*) 2313*O*, ridge and foot of Kalihi Valley, March 9, 1916 (Bish.); *idem* 2553*O*, Manoa Ridge, March 17, 1919 (Bish.); *idem* (*& C. M. Cooke*), Koolauloa Mts. between Punaluu and Kaipapau, May 3–8, 1909 (Bish.); *F. R. Fosberg* 9525, suffrutescent herb 0.4 meter tall, wet, bushy ridge, alt. 740 meters, Waikane-Schofield Trail, divide between Kahana and Waianaeuka, May 14, 1933 (Field); *idem* 10285, exposed ridge, alt. 740 meters, Waikane-Schofield Trail, Koolau Mts., Kahana, September 22, 1933 (Field); *idem* 10726, suffrutescent herb 1 meter tall, wet forest, alt. 550 meters, Palolo-Waialae-Niu, Koolau Mts., December 27, 1934 (Field); *idem & K. Duker* 8680, alt. 620 meters, rain forest, ridge, South Kipapa Gulch, Koolau Mts., September 18, 1932 (Field; Kew); *iidem* 8803, alt. 600 meters, wet forest, Waikane-Schofield Trail, Koolau Mts., Kahana, October 16, 1932 (Field; Gray; Kew); *Gaudichaud* (*Voy. la Bonite*) 220 pro parte and 221 p.p., Hawaiian Isls., September–October, 1836 (Par.); *M. L. Grant* 7242, shrub 4 ft. tall, alt. 690 meters, in *Metrosideros* forest, Kipapa-Waiawa Ridge, Waipio, August 7, 1934 (Field); *A. A. Heller* 2901, plentiful in forest, alt. 750 meters, on and near summit, Konahuanui, November 2, 1895 (Brit.; Calif.; Field; Kew; Minn.; Mo.; N.Y.; Par.; Petrop.; Phila.); *William Hillebrand,* Oahu (Kew); *idem,* Nuuanu (Berl.; Gray); *idem & J. M. Lydgate,* Konahuanui, October 29, 1870–1872 (Bish.); *E. Y. Hosaka* 1107 and 1108, on wet, denuded ridge, alt. 600 meters, Kipapa Gulch, south ridge, Waipio, Koolau Mts., July 2, 1933 (Bish.; Field); *Noel Krauss* 4128, wet, open woods in upper Manoa Valley along Mt. Olympus, Pauoa Flats Trail, December 6, 1931 (Field); *Mann & Brigham,* Oahu (U.S.); *iidem* 98 pro minim. parte, Oahu (Del., cum *B. asymmetrica* commixt.); *Alfred Meebold* (*Degener* distrib. No.)

4166, east ridge of Manoa Valley, June, 1932 (Field; Kew); *Carl Skottsberg* 153 and 153*b*, alt. 500–600 meters, Koolau, Nuuanu-Kalihi Ridge, August 13, 1922 (Goth.); *idem* 1776, Nuuanu-Pauoa Ridge, September 12, 1926 (Goth.); *idem* 1859, ridge above Kahana Bay, Koolau Mts., September 17, 1926 (Goth.); *Harold St. John* 10154, low shrub, alt. 690 meters, upper ridge Waikane-Schofield Trail, Kahana, January 19, 1930 (Field); *idem* 11193, shrub 4 ft. tall, alt. 600 meters, wooded ridge, main ridge running southwest from Puu Lanihuli, Kalihi-Nuuanu, November 29, 1931 (Bish.; Field); *U. S. S. Pacif. Expl. Exped.* under *Capt. Wilkes*, Oahu, 1840 (type, U.S.: cotypes, Gray; N.Y.); *D. L. Topping* 3060, growing 3–4 ft. high, along ridge, Wahiawa-Waihane Trail, March 8, 1925 (N.Y.); *idem* 3341, dry ridge along trail at 600 meters alt., Waipio Ridge, June 30, 1929 (Berl.; Boiss.; Brit.; Field; Gray; Kew; U.S.); *idem* 3343, growing 3 ft. high along trail, open and dry, Waipio Ridge (Field); *idem* 3346, open trail, Waipio Ridge, June 30, 1929 (Field); *Wawra* (*H. M. Frigate Donau*) 1664, Oahu, 1868–1871 (Petrop.); *M. Yamaguchi* 1218, wet mountain ridge, alt. 570 meters, south ridge of Kipapa Gulch, Waipio, Koolau Mts., May 15, 1932 (Field); *T. G. Yuncker* (*O. Degener* distrib. No.) 4256, alt. 600 meters, rainy region, Kipapa Gulch Trail, September 18, 1922 (Field; Kew).

Bidens macrocarpa can easily be told from all other species by its large, flat, usually brownish achenes, with many of their subapical aristae decurrent into flattened, lateral achenial margins or wings. Hillebrand (Fl. Haw. Isls. 215. 1888) confused other names with *B. macrocarpa*. Thus he listed as a synonym *Bidens mutica* Nutt. The type of *B. mutica* (Brit.) is true *B. sandvicensis* Less. He created a var. γ. for plants from Niu and Makaleha, Oahu, to which he referred (1) *B. sandvicensis* as understood by A. Gray "(pro parte)" and (2) "probably also *B. gracilis*, Nutt." The type of his var. γ. (Brit.), however, is likewise *B. sandvicensis* Less. (cf. footnote under *B. sandvicensis* Less., "Specimens examined"); and while indeed Gray had usually treated such material as *B. sandvicensis*, it must be noted that he was correct in so doing, as the species *B. sandvicensis* Less. was a valid one and in the main Gray was fairly familiar with it. *B. gracilis* Nutt. was of course quite unlike either *B. macrocarpa* or *B. sandvicensis* and reduces to *B. asymmetrica* (Lévl.) Sherff.

According to Heller's printed note (Minn.), *B. macrocarpa* "appears to be confined to the forest."

An apparently teratological form occurs with conspicuously laciniate-dentate leaf divisions. The leaves are 1–2- or sub-3-

BIDENS TORTA Sherff (figs. *a–g*)
BIDENS CERVICATA Sherff (figs. *h–p*)

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pinnatifid. I have seen only one capitulum, and this one was very immature.

Specimens examined: *William Bush* 7461, Mt. Tantalus, June 11, 1929 (Berl.; N.Y.); *Degener, Park, Bush, Potter, & Topping* 10069, near summit, west of Poamoho Trail, Laie, August 25, 1935 (Deg.); *Degener, Park, & Hirai* 4044, wind-swept mountain summit about halfway, Waikane-Schofield Trail, April 4, 1931 (Deg.; N.Y.).

Bidens macrocarpa var. *β.* **ovatifolia** (Gray) Sherff, op. cit. 85: 7. 1928.

Bidens sandvicensis var. *ovatifolia* Gray, Proc. Amer. Acad. 5: 128. 1861.

Campylotheca (*Coreopsis*) *macrocarpa* var. *ovatifolia* (Gray) Hillebr. Fl. Haw. Isls. 215. 1888.

Caulis herbaceus. Folia simplicia vel pauca tripartita, ovata, subcordata, longissime tenuiterque petiolata petiolis usque ad 6 cm. longis. Ovaria coronula setularum superata, exaristata.

Type specimen: Collected by the *United States Southern Pacific Exploring Expedition* under *Captain Wilkes* on the Island of Oahu, Hawaiian Islands, 1840 (U.S.).

Distribution: Known only from the type locality, Oahu, Hawaiian Islands.

Specimens examined: *U. S. S. Pacif. Expl. Exped.* under *Capt. Wilkes*, Oahu, 1840 (type, U.S.).

I have never seen another specimen exactly matching the type, but *Bush & Topping* 3780 and *Forbes* 2313*O*, listed under the species proper, show in their lowermost leaves an approach to the *ovatifolia* form. The type's capitula are referable to *B. macrocarpa* rather than to *B. sandvicensis*. In fact, Drake del Castillo (Illustr. Fl. Ins. Mar. Pacif. 209. 1890) equated the *ovatifolia* form outright with *B. macrocarpa* (*Coreopsis macrocarpa* Gray). The exceptional nature of the leaves, however, makes it seem best to retain a varietal status for Gray's type, as was done by Hillebrand.

EXPLANATION OF PLATE XVII, FIGS. *a–i*

Bidens macrocarpa: a, flowering and fruiting branch, ×0.56; *b*, one of larger leaves, ×0.56; *c*, exterior involucral bract, ×3.38; *d*, interior involucral bract, ×3.38; *e*, ray corolla, ×3.38; *f*, palea, ×3.38; *g*, disc floret, ×3.38; *h* (submature), *i* (mature, outer), achenes, ×3.38; *a–h*, from *Forbes* 2313*O* in Hb. Bish.; *i*, from *Forbes*, Palolo Valley Ridges, Isl. Oahu, December 17, 1908, ibid.

29. **Bidens magnidisca** Deg. & Sherff ex Sherff, Bot. Gaz. 93: 216. 1932. Pl. XVII, figs. *j–l.*

Herba erecta, perennis, fruticosa, glabra, caule tetragona, verisimiliter 6–10 dm. alta. Folia petiolata petiolis tenuibus usque ad 9 cm. longis, petiolo adjecto usque ad 2 dm. longa, acriter serrata, nunc indivisa, ovata vel ovato-lanceolata, basi (saepe obliqua) late cuneata vel rotundata vel truncato-subcordata, apice acuta vel breviter acuminata, usque ad circ. 4.5 cm. lata; nunc pinnatim 3–5-partita, foliolis ovatis vel oblongo-lanceolatis, lateralibus basi valde obliquis et saepe (praecipue superioribus) decurrentibus, plerumque 1–3.5 cm. latis. Capitula irregulariter paniculata, pedicellata pedicellis glaberrimis saepius 1–2-bracteatis plerumque 1–3.5 cm. longis, radiata, pansa ad anthesin circ. 2 vel vix 2.5 cm. lata, 0.8–1.5 cm. alta. Involucrum interius primum (pro capitulo juveni) late cylindricum vel turbinato-globosum, glaberrimo-subnitidum et supra clausum, exterius patens vel reflexum; demum bracteis exterioribus (6–8) saepe irregulariter positis, glabris, ovatis vel linearibus vel late oblongis, apicem obtusum versus saepe latioribus, plerumque tantum 1.5–3 rarius 5 mm. latis; interioribus oblongo-lanceolatis plerumque 5–7 mm. longis. Flores ligulati 6–8, non perspicui, flavidi, ligula cuneato-lineares, apice acriter (saepe profunde atque irregulariter) 3–4-dentati, tantum 6–9 mm. longi et 1.5–3 mm. lati. Flores disci circ. 30–45, aurantiaci, limbo acriter profundeque 5-lobati, deorsum sensim angustati, stylis antherisque exsertis paleas lineares ac flores ligulatos superantibus. Achaenia plana, linearioblonga, utrinque moderate attenuata, aegre torta, glabra, brunneonigra, valde mediano-nervata, utraque facie circ. 4-sulcata, corpore 8–15 mm. longa et 1–2 mm. lata, apice ipso exaristata sed infra apicem saepe irregulariter 1–2-aristata aristis brevibus validis plus minusve calvis ex achaeniorum marginibus (alis) desinentibus manifeste productis.

Type specimen: Collected by *Otto Degener, Kwan Kee Park,* and *F. Kruse,* No. 4080, much localized on sunny, grassy, shrubby slope, western ridge of Kaipapau (not "Waipapau" as erroneously printed in original description) Valley just within forest reserve, Hauula, Island of Oahu, Hawaiian Islands, October 11, 1931 (Field, 4 sheets).

Distribution: Known only from type locality on Island of Oahu, Hawaiian Islands.

Specimens examined: *Degener, Park, & Kruse* 4080 (4 type sheets, Field: cotypes, Berl.; Brit.; Del.; Field; Gray; Kew; Mo.; Mus. V.;

BIDENS GRACILOIDES Sherff (figs. *a–g*)
BIDENS WAIANENSIS Sherff (figs. *h–p*)

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N.Y.; Par.; U.S.; U.V.); *N. H. Krauss*, alt. 300–360 meters, Hauula, Koolau Mts., January 6, 1934 (Field).

Should be investigated as to possibility of hybrid origin.

EXPLANATION OF PLATE XVII, FIGS. *j–l*

Bidens magnidisca: j (young) and *k* (flowering), heads, ×0.67; *l*, achene, ×3.38; all from type specimens.

30. **Bidens micranthoides** Sherff, Bot. Gaz. 70: 100. 1920. Pl. XVIII.

Bidens angustifolia Nutt. Trans. Amer. Phil. Soc. ser. 2. 7: 369. 1841; non *Bidens angustifolia* Lam. Encycl. 1: 416. 1783.

Campylotheca angustifolia (Nutt.) Walp. Repert. 2: 618. 1843.

Herba glabrata, infra suffruticosa, supra ramosa ramis gracilibus, 3–5 dm. alta. Folia petiolata petiolis tenuibus 1–5 cm. longis, petiolo adjecto 3–7 (–12.5) cm. longa et 2–5 (–8) cm. lata, pinnatim 3–7-partita foliolis ovato-lanceolatis vel raro ovatis, serratis, ad apicem plerumque acutis vel etiam longissime acuminatis, nunc membranaceis, nunc subrugoso-crassiusculis, foliolis imis raro tripartitis. Capitula supra folia exserta, laxe corymbosa, ad anthesin 5–7 mm. alta et 1.5–2.5 cm. lata. Involucri bracteae exteriores 5–7, lineares, ad apicem subobtusae, glabratae vel glanduloso-pulverulentae, 1–2.5 mm. longae, interiores multo longiores. Flores ligulati 4–6, flavi, ligula ovato-oblanceolati, ad apicem 2–4-dentulati, circ. 1 cm. longi. Achaenia linearia, exalata, nunc recta nunc torta, atra, supra et ad margines sparsim setosa, apice setoso-coronulata et biaristata aristis retrorsum hamosis et usque ad 1.5 mm. longis vel saepe plus minusve exaristata, corpore 7–9 mm. longa.

Type specimen: Collected by *Charles Noyes Forbes*, No. 704*K*, Haupu Range, Nawiliwili Bay, Island of Kauai, Hawaiian Islands, October 31, 1916 (Bish.).

Distribution: Islands of Oahu and Kauai, Hawaiian Islands.

Specimens examined: *R. S. Bean* 1, arid, rocky place, east ridge, Manoa Valley, Oahu, September 3, 1927 (Bn.); *Beechey*, Oahu (Kew); *William Bush* (*Degener* distrib. No.) 4163, on slopes of Waimea Canyon near lookout on way to Kokee, Kauai, June 9, 1932 (Berl.; Boiss.; Calif.; Field; Gray; Kew; Mo.; Mun.; N.Y.; Par.; U.V.); *idem* 4164, eodem loco (but at lower elevation) et tempore (Field, 2 sheets; forma foliorum segmentis angustioribus quidem linearibus); *Otto Degener & Henry Wiebke* 2167, dry, sunny canyon side, Olokele Canyon, Kauai, July 3, 1926 (Berl.; Field, 3 sheets; Kew); *Faurie*

995, Kolea, Kauai, December, 1909 (Brit.); *Forbes* 494*K*, Wailua Falls, Kauai, October 5, 1916 (Bish.); *idem* 592*K*, Nonou Mts., Kauai, October 16–17, 1916 (Bish.); *idem* 704*K* (type, Bish.: cotype, Mo.); *idem* 1849*O*, Waiolani Ridge, Oahu, October 27, 1913 (Bish.); *idem* 2014*O*, Oahu, November 17, 1914 (Bish.); *Gaudichaud* (*Voy. la Bonite*), Hawaiian Isls., October, 1836 (Del.); *Thomas Nuttall*, Oahu (Brit.; type of *Bidens angustifolia* Nutt.); *Swezey* (*Degener* distrib. No.) 4183, top of Puu Kapele, Kauai, July 13, 1932 (Field; Kew); *idem* (*Degener* distrib. No.) 4206 pro parte, Kokee region, Kauai, July, 1932 (Berl.; Field; Gray; cum *B. sandvicensi* commixt.); *J. F. G. Stokes*, cliffs at Puunui, Oahu, December, 1915 (Bish.); *D. LeRoy Topping* 2939, Niu Ridge, Oahu, November, 1924 (Calif.).

Resembles more or less *B. micrantha* Gaud. In some cases the similarity in foliage is very deceiving. The specimen by Beechey had been determined as *B. micrantha* by Hooker and Arnott (cf. Hook. & Arn. Bot. Beech. Voy. 86. 1841), although in this case the foliage was very distinct from that of Gaudichaud's plate for *B. micrantha*. Asa Gray, who later studied the Beechey plant, referred it to *B. sandvicensis* Less. (cf. Gray, Proc. Amer. Acad. 5: 128. 1861), a species to which indeed *B. micranthoides*, through its Oahu material, seems transitional. From both *B. micrantha* and *B. sandvicensis* this species differs most noticeably in habit, being lower in stature, apparently more open in its branching, and certainly with the inflorescence much more open, the heads being variously scattered and at more different levels, and not so corymbose.

As remarked in an earlier paper (Bot. Gaz. 76: 161. 1923), Asa Gray (Proc. Amer. Acad. 5: 127–128. 1861) suspected *B. angustifolia* Nutt. of belonging to *B. sandvicensis*, and Drake del Castillo (Ill. Fl. Ins. Mar. Pacif. 210. 1890), evidently with Gray's treatment at hand, definitely equated the two species. A study, however, of Nuttall's type (Brit.) and the other specimens cited above shows a plant with aspect very different from that of *B. sandvicensis*. It is found to match exactly certain of these above cited specimens of *B. micranthoides*. The name *B. angustifolia* is rejected, however, because of the earlier homonym *B. angustifolia* Lam.[1]

EXPLANATION OF PLATE XVIII

Bidens micranthoides: a, flowering and fruiting specimen, ×0.56; *b*, larger and more compound leaf, ×0.56; *c*, exterior involucral bract,

[1] A name referred by Lamarck himself (loc. cit.) and by A. H. Moore (Proc. Amer. Acad. 42: 528. 1907) to *Spilanthes urens* Jacq.

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×5.57; *d*, interior involucral bract, ×5.57; *e*, ray corolla, ×2.79; *f*, palea, ×5.57; *g*, disc floret, ×5.57; *h*, achene, ×5.57; all from type.

31. **Bidens Asplenioides** Sherff, Bot. Gaz. 70: 101 and *pl. 12, figs. a–f.* 1920. Pl. XIX, figs. *a–f.*

Supra herbacea, infra verisimiliter suffruticosa, glabra, ramosa, caule subtetragona, ± 4 dm. alta. Folia petiolata petiolis tenuibus 3–7 cm. longis, petiolo adjecta 6–16 cm. longa, submembranacea, pinnata vel ternata, foliolis lanceolatis vel anguste ovato-lanceolatis, crenatis, non ciliatis, terminali ad apicem longe acuminato et 6–8 cm. longo, lateralibus ad apicem acutis vel subobtusis et dimidio brevioribus. Capitula multa, radiata, pansa ad anthesin circ. 1.5–2 cm. lata et 6–8 mm. alta, pedunculata pedunculis tenuibus 1–6 cm. longis. Involucri bracteae exteriores circ. 5, lineari-spathulatae, demum reflexae, glabratae, circ. 2 mm. longae; interiores lanceolatae, dimidio longiores. Flores ligulati (mancos tantum vidi) flavi, circ. 8–10 mm. longi. Achaenia (manca vidi) linearia, exalata, supra glabrata vel sparsim setosa, apice nuda vel biaristata, corpore verisimiliter 5–7 mm. longa.

Type specimen: Collected by *John F. G. Stokes*, at Kaali, Island of Niihau, Hawaiian Islands, January, 1912 (Bish.).

Distribution: Known only from type locality on Island of Niihau, Hawaiian Islands.

Specimens examined: *J. F. G. Stokes*, Kaali, etc. (type, Bish.).

The elongate, crenate terminal leaflets offer a curious superficial resemblance in outline to the leaves or leaflets of some species of *Asplenium* (*A. pinnatifidum* Nutt., etc.).

EXPLANATION OF PLATE XIX, FIGS. *a–f*

Bidens Asplenioides: a, branch, past fruiting, ×0.54; *b*, exterior involucral bract, ×5.39; *c*, interior involucral bract, ×5.39; *d*, ovary (of ray floret?), ×5.39; *e*, *f*, fragments of mature achenes, ×5.39; all from type.

32. **Bidens pulchella** (Less.) Schz. Bip. Flora 39: 362. 1856; cf. Sherff, Bot. Gaz. 85: 25 and *pl. 2, figs. j–p.* 1928. Pl. VI, figs. *j–p.*

Adenolepis pulchella Less. Linnaea 6: 510 and *pl. 6.* 1831.

Campylotheca pulchella (Less.) Hillebr. Fl. Haw. Isls. 211, 212. 1888.

Coreopsis pulchella (Less.) Drake del Cast. Ill. Fl. Ins. Mar. Pacif. 210. 1890.

Herba parva, annua, erecta, facie *Heterospermi* vel *Chrysanthelli;* caule acute angulato, subglabrato vel apice hispidiusculo-puberulo, infra simplici supra non valde ramoso, ±1.2 dm. alto. Folia petiolata petiolis 2–6 mm. longis, petiolo adjecto tantum 1.5–2.2 cm. longa, membranacea, ciliata, faciebus fere glabra, primaria bipinnata, foliolis lateralibus 2 jugis, segmentis longe cuneatis obtusis saepe trilobatis. Capitula terminalia, parva, radiata, pansa ad anthesin ± 5 mm. lata et circ. 4 mm. alta, disco 5–10-floro. Involucrum cylindraceum, bracteis extus hirsutiusculis; exterioribus 4–6, linearibus, ciliatis, patentibus, apice obtusis vel abrupte subapiculatis et in sicco atris, 1.5–3 mm. longis; interioribus lineari-lanceolatis, quam exterioribus saltem dimidio longioribus. Flores ligulati circ. 4 vel 5, lutei, emarginati, ligula rotundo-elliptici, quam flores tubulosi paulo breviores. Achaenia lineari-oblonga, atra, dorso convexa, ventre plana, naviculaeformia, superne subsubito inferne sensim angustata, exaristata, faciebus 3-costata, erecto-ciliata, dorso apicem versus ventre omnino erecto-setosa, circ. vel fere 3 mm. longa et 0.9 mm. lata.

Type specimen: Collected by *Adelbert Von Chamisso*, Island of Oahu, Hawaiian Islands, 1816.[1]

Distribution: Known only from type locality, Island of Oahu, Hawaiian Islands.

Specimens examined: *Von Chamisso*, Oahu, 1816 (Berl.).

Asa Gray (Proc. Amer. Acad. 5: 128. 1861) suspected this species of being merely the awnless state of *Bidens sandvicensis* Less. An examination of Lessing's type material of the two species shows them to be widely distinct. In fact, no other Hawaiian species combines the dwarf habit, delicate bipinnate foliage, minute, terminal, shortly pedunculate heads and small, exaristate achenes of *B. pulchella.* It is not improbable that this is one of the doubtless numerous species which have become extinct on the islands of the Hawaiian group during the past century, since the coming of civilization and the application of more intensive methods to the local agriculture and grazing.

EXPLANATION OF PLATE VI, FIGS. *j–p*

Bidens pulchella: j, entire plant, ×0.68; *k*, exterior involucral bract, ×5.44; *l*, interior involucral bract, ×5.44; *m*, ray corolla, ×5.44; *n*, palea, ×5.44; *o*, disc floret, ×5.44; *p*, achene, ×5.44; all from type.

[1] No herbarium was cited for the type. A good specimen (the subject of my plate) is preserved, however, in Berlin and may safely be taken as a type of the species.

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33. **Bidens uapensis** (F. Brown) Sherff, comb. nov.

Campylotheca uapensis F. Brown, Fl. S. E. Polynesia 3 (Bishop Mus. Bull. No. 130): 358 and *fig. 65*. 1935.

Fruticosa forsitan subarborescens, altitudine ignota, subglabra. Folia tenuiter petiolata petiolis interdum sparso-ciliatis basi connatis 2–4 cm. longis, petiolo adjecto 6–10 cm. longa et 2–4 cm. lata, membranacea, cordata, apice acuminato-acuta, basi rotundata vel cordata, serrata (dentibus circ. 5 vel 6 per 1 cm.), subtus secundum rhachidis basim squarrose caespitoseque hispida. Capitula subsolitaria pedunculis ramos terminantibus tenuibus ± 5 cm. longis folia non superantibus, radiata, pansa ad anthesin ± 2.5 cm. lata et circ. 6–7 mm. alta. Involucri bracteae exteriores 6–9, oblonge vel subrhomboide lineari-lanceolatae, manifeste 3-nervatae, inferne saepe ciliatae aliter subglabrae, apice obtusae vel acutae, circ. 5–6 mm. longae; interiores paulo longiores, subsparsim minutissimeque pubescentes. Flores ligulati numerosiori (14 fide Brownii), flavi, ligula oblongo-oblanceolati, apice plus minusve denticulati, ± 1.3 cm. longi et circ. 3–4 mm. lati. Paleae lineares, 5–7 mm. longae. Achaenia (fide Brownii) oblonge linearia, exaristata, marginibus apiceque longo-ciliata, saltem 4–5 mm. longa et ± 0.5 mm. lata.

Type specimen: Collected by *E. H. Quayle*, No. 1149, at altitude of 810 meters, Mt. Tekahoipu, Island of Uapou, Marquesas Islands, September 9, 1922 (Bish.).

Distribution: Island of Uapou, Marquesas Islands.

Specimens examined: *E. H. Quayle* 1066, alt. 1,500 meters, Uapou, September 7, 1922 (Bish.); *idem* 1149 (type, Bish.).

34. **Bidens Populifolia** Sherff, Bot. Gaz. 86: 438 and *pl. 16*. 1928. Pl. XX.

Herba e radice (ut videtur) annua, usque ad 8 dm. alta, glabra; caule tetragono, subsimplici vel etiam valde ramoso, non robusto. Folia petiolata petiolis tenuibus nunc 1.5–6 cm. nunc 6–10 cm. longis, petiolo adjecto usque ad 2 dm. longa, membranacea, pallidiora, vix ciliata, serrata dentibus rotundatis obtuseque callosoapiculatis, plerumque indivisa, circumambitu ovato-cordata vel deltoideo-cordata, basi saepe tantum subcordata vel etiam truncata obliquave, apice nunc subobtusa nunc acuta vel rarius plus minusve subacuminata; rariter (et plus minusve irregulariter) pauca 2–3-partita, foliolo terminali late rhomboideo-lanceolato vel ovato-lanceolato vel rotundato, lateralibus obliquis et rhomboideo-ovatis. Capitula non numerosa, in inflorescentia corymbiformi disposita,

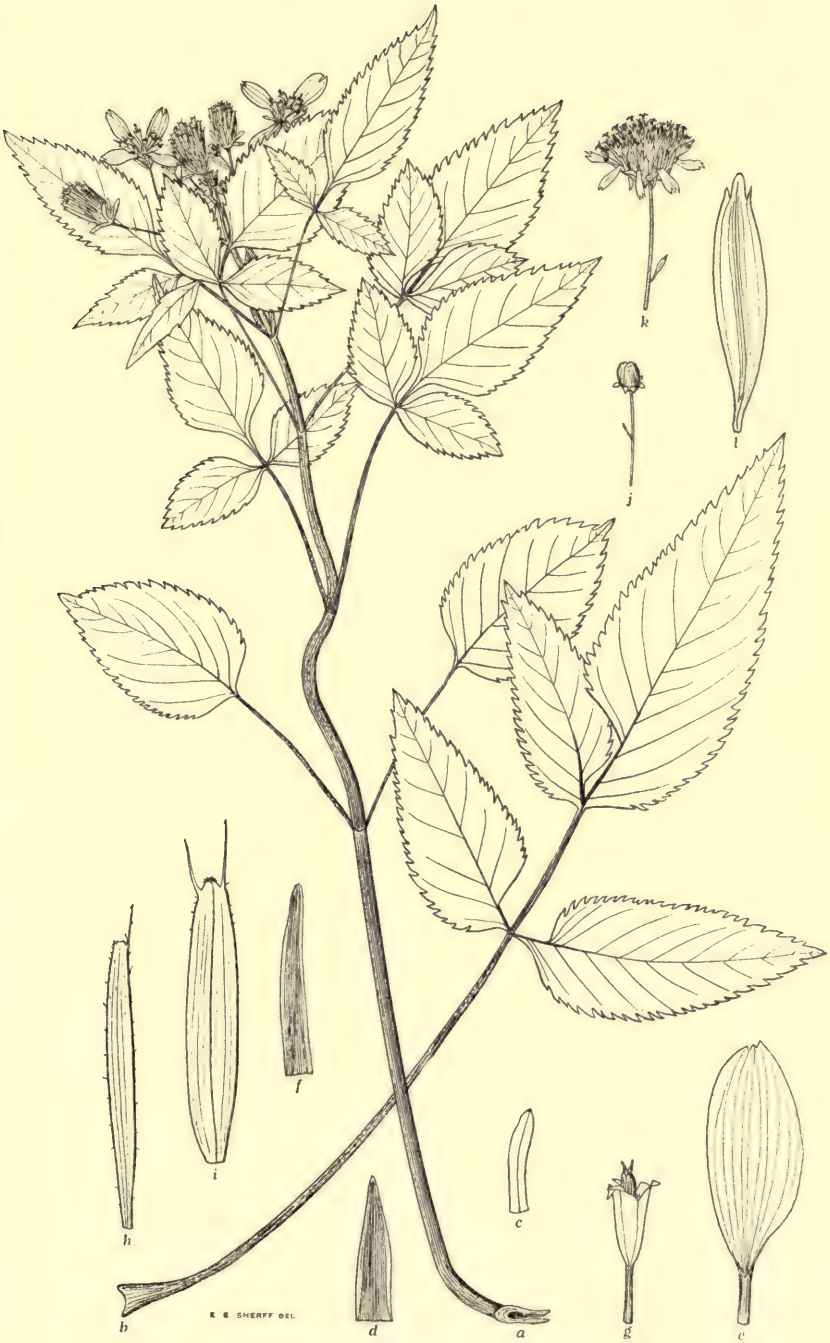
radiata, pedicellata pedicellis tenuibus usque ad 5 cm. longis, pansa ad anthesin circ. 3 cm. lata et 7–9 mm. alta. Involucri bracteae valde dissimiles, exteriores 5–7, patenti-reflexae, glabrae, nunc late oblongo-lineares nunc spathulato-obovatae apice obtusae vel rotundatae, 1.5–3.5 mm. longae; interiores lanceolatae, apicem versus minute pubescentes, 5–6.5 mm. longae. Flores ligulati 6–8 (rariter tantum 5), flavidi, ligula oblongo-lineares vel oblanceolati, apice plerumque 3-dentati, 1.2–1.5 cm. longi. Achaenia anguste linearia, recta, exalata, subnigra, obcompressa, unica facie obsolete circ. 8-striata, margine sparsim erecteque ciliata, corpore 7–12 mm. longa et 0.8–1.1 mm. lata et paleas apice rufescentes paulo demum saepe excedentia, apice plerumque biaristata; aristis tenuibus, supra retrorsum infra antrorsum hamosis, usque ad 1 mm. longis.

Type specimen: Collected by *Otto Degener, Ross S. Bean, D. Le Roy Topping,* and *Anthony Apo,* No. 2514, growing with *Pandanus* and stunted *Metrosideros,* grassy slope back of small Hawaiian church on east side of Kahana Valley, Island of Oahu, Hawaiian Islands, February 12, 1928 (Field, 4 sheets).

Distribution: Known only from type locality on Island of Oahu, Hawaiian Islands.

Specimens examined: *R. S. Bean,* Oahu, April 12, 1931 (Field; Kew); *idem* 2322, sunny, rocky ridge, foot of left ridge of Kahana Valley, January 1, 1928 (Field; Kew); *William Bush & D. L. Topping* 26, alt. 540 meters, wet slope, Kahana Valley Slope, June 9, 1929 (Field; Gray; U.S.); *Degener, Bean, Topping, & Apo* 2514 (type, Field, 4 sheets: cotypes, Berl.; Boiss.; Brit.; Gray; Kew; Mo.; Mun.; Mus. V., etc.); *Degener, Park, Bush, Nitta, & Westgate* 4114, dry, grassy cliffs, about 3 miles up Kaipapau Valley, March 27, 1932 (Berl.; Brit.; Field; Gray; Kew); *Degener, Park, Iwasaki, & Yamamoto* 4259, alt. 240 meters, among grasses and shrubs on lateral ridge, northern slope of Kahana Valley, November 6, 1932 (Berl.; Brit.; Calif.; Del.; Field; Goth.; Gray; Kew; Mo.; Mun.; Mus. V.; N.Y.; Par.; Phila.; U.S.; U.V.).

This species is characterized by the very distinct *Populus* aspect of its foliage, the resemblance to the foliage of *P. deltoides* Marsh., for example, being at times very striking. Hillebrand (Fl. Haw. Isls. 215. 1888) appears not to have known this plant. Under *Campylotheca macrocarpa* he lists the (to *B. Populifolia*) faintly similar var. *ovatifolia,* transferred by him from varietal rank under *Bidens sandvicensis* Less., where Asa Gray had originally placed it. He then gives a detailed description of mature plants, a description which could



BIDENS MACROCARPA (Gray) Sherff (figs. *a–i*)
BIDENS MAGNIDISCA Deg. & Sherff *ex* Sherff (figs. *j–l*)

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not have come from the single, very immature type of the var. *ovatifolia* (U.S.). The true var. *ovatifolia*, recently placed (Bot. Gaz. 85: 7. 1928) under *Bidens macrocarpa*, has sharply serrate leaves, while *B. Populifolia* has round and obtuse teeth. It is clear from Hillebrand's text that, the synonym var. *ovatifolia* Gray being excluded, his treatment applied to the herbaceous forms of *Bidens asymmetrica* (Lévl.) Sherff, found upon the Island of Oahu. In fact, we may note that one able student of the Hawaiian flora, Joseph Rock, had labeled a cotype specimen of *B. asymmetrica* (*Faurie* 960, Par.) with the equation: "*Coreopsis macrocarpa* Hbd. var. β. Hbd. *Lipochaeta asymmetrica* Lévl. (teste) Rock" (the latter name being a synonym for *Bidens asymmetrica*). A consideration of these herbaceous forms of *B. asymmetrica* (" . . . Achenes . . . often spirally twisted . . . "), however, shows that they too have little in common with the species here under discussion.

EXPLANATION OF PLATE XX

Bidens Populifolia: a, main portion of younger plant, flowering and fruiting, ×0.55; *b*, leaf from lower part of same, ×0.55; *c*, exterior involucral bract, ×3.32; *d*, interior involucral bract, ×3.32; *e*, ligulate floret, ×1.66; *f*, palea, ×3.32; *g*, disc floret, ×3.32; *h*, *i*, achenes, ×3.32; all from cotype material in Hb. Boiss.

35. **Bidens Skottsbergii** Sherff, Bot. Gaz. 91: 311. 1931. Pl. XXI.

Flores ligulati 1.7–2 cm. longi et 6–8 mm. lati.

B. Skottsbergii sensu stricto.

Flores ligulati 1–1.4 cm. longi et 3–4.5 mm. lati.

var. β. *conglutinata.*

Frutex glaberrimus, verisimiliter 1 m. altus, ramosus. Folia tenuiter petiolata petiolis circ. 1–3 cm. longis, petiolo adjecto 8–13 cm. longa, pallidiora, forsitan semper membranacea, indivisa, oblongo-ovata, subgrosseserrata (unico latere saepius 12–18-serrata), apice subobtusa, basi late cuneata, principalia 3.5–5 cm. lata. Capitula pauca, laxe paniculata, pedunculata pedunculo subtenui usque ad 9 cm. longo, radiata, pansa ad anthesin 3–4 cm. lata et 9–12 mm. alta. Involucri bracteae exteriores circ. 8–10, glaberrimae, nunc late lineari-oblongae nunc oblongo-spathulatae, apice obtusae, demum saepe patentes, 4–6 mm. longae; interiores oblongo-lanceolatae paulo longiores, apice pubescentes. Flores ligulati circ. 8, flavi, ligula nunc oblongi nunc obovati, apice truncato 2–5-dentati et saepe subprofunde scissi, 1.7–2 cm. longi et 6–8 mm. lati. Achaenia nigra, plana, lineari-oblonga, utraque facie plus minusve 8-striata,

corpore glabro 8–10.5 mm. longa et circ. 1.35 mm. lata, lateribus marginata sed non vere alata, apice ipso biaristata (aliter glabra); aristis subvalidis, stramineis brunneisve, retrorsum multihamosis, 1.5–2 mm. longis.

Type specimen: Collected by *Carl Johan Fredrik Skottsberg*, No. 2092, near Puna Road, south of Hilo, Island of Hawaii, Hawaiian Islands, September 30, 1926 (Goth.).

Distribution: Known only from type locality on Island of Hawaii, Hawaiian Islands.

Specimens examined: *Yoshimasa Nitta* (*O. Degener* distrib. No.) 4126, cult. for tea in Kapoho, from seed collected at Kamailii (near Kauleau), Puna, December 15, 1931 (Field); *idem* (*O. Degener* distrib. No.) 4127, on "aa" lava, near English public school, Kapoho, eodem tempore (Field); *idem* 4215, on "aa" lava, along railroad track 23 miles from Hilo toward Kapoho, eodem tempore (Field); *Skottsberg* 2092 (type, Goth.); *H. St. John, R. S. Bean, & E. Y. Hosaka* 11239, plant 4 ft. tall, alt. 60 meters, in open woods, 1 mile north of Kaimu, December 21, 1931 (Bish.; Field).

Stands next to *Bidens Populifolia* (of the Island of Oahu), from which it differs in its oblong-ovate, basally wide-cuneate leaf blades, and its broader and more oblong achenes, these lacking erect apical setae between the aristae and having the aristae more densely and regularly retrorse-hamose.

Bidens Skottsbergii var. *β.* **conglutinata** (Deg. & Sherff) Sherff, Bot. Gaz. 92: 206. 1931.

Bidens hawaiensis var. *conglutinata* Deg. & Sherff, Bot. Gaz. 89: 364. 1930; cf. Degener, Ferns Flow. Pl. Hawaii Nat. Park 300 and *pl. 89*. 1930.

A specie floribus ligulatis minoribus (tantum circ. 1–1.4 cm. longis et 3–4.5 mm. latis), foliis plerumque coriaceo-rugosis differt.

Type specimen: Collected by *Antone Borges*, No. 3798, on dry lava flow of 1840, southeast of Pahoa, easternmost part of Island of Hawaii, Hawaiian Islands, November 18, 1929 (Field, 2 sheets).

Distribution: Known only from type locality on Island of Hawaii, Hawaiian Islands.

Specimens examined: *Borges* 3798 (type, Field, 2 sheets: cotypes, Berl.; Gray; Kew); *Otto Degener & Yasuma Iwasaki* 3819, being eaten by cattle, on arid, sunny "aa" lava of the 1788 flow, between Pahoa and Kalapana, February 7, 1930 (Berl.; Boiss.; Brit.; Calif.; Field,

BIDENS MICRANTHOIDES Sherff

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2 sheets; Gray; Kew; Mo.; Mun.; N.Y.; Par.; U.S.); *Otto Degener & Henry Wiebke* 2165, west slope of Polulu Valley, August 11, 1926 (Field); *William Hillebrand*, Hawaii (Kew).

Perhaps passing into the species proper.

EXPLANATION OF PLATE XXI

Bidens Skottsbergii: a, flowering and fruiting spray, ×0.55; *b*, exterior involucral bract, ×3.29; *c*, interior involucral bract, ×3.29; *d*, ray floret, ×2.2; *e*, palea, ×3.29; *f*, disc floret, ×4.39; *g*, achene, ×3.29; all from type.

36. **Bidens obtusiloba** Sherff, Bot. Gaz. 88: 289 and *pl. 20*. 1929. Pl. XXII.

Frutex glaber, ± 6 dm. altus, ramosus; ramis quadrangulatis, internodiis inferioribus quam foliis plerumque multo brevioribus. Folia tenuiter petiolata petiolis usque ad 3.5 cm. longis, petiolo adjecto usque ad 8 cm. longa, bipinnati- (plerumque biternati-) secta, segmentis primariis circumambitu oblongo-ovatis vel saepe deltoideis, membranaceis, obsolete ciliatis, 1.5–3.5 cm. longis et paulo angustioribus, lateralibus breviter petiolulatis, omnibus in lobos vel dentes obtusos atque apice minute cuspidatos rursus dissectis. Capitula non numerosa, plus minusve corymbosa, radiata, pansa ad anthesin 1–1.5 cm. lata et 5–7 mm. alta, tenuiter pedicellata pedicellis usque ad 1.8 cm. longis. Involucri nunc glabri nunc basi pubescentis bracteae exteriores 4 vel 5, lineares, apice subacutae, circ. 2 mm. longae, quam interiores lanceolatae dimidio breviores. Flores ligulati circ. 4 vel 5, flavidi, ± 5 mm. longi, anguste obovati, apice 2- vel 3-dentati. Achaenia linearia, recta vel subrecta, atro-brunnea, valde obcompressa, unica facie circ. 8-striata, duabus faciebus non nisi summam versus setosa, marginibus erecto-setosa, apice exaristata sed erecto-hispida, corpore 6–7.5 mm. longa et circ. 1 mm. lata.

Type specimen: Collected by *D. Le Roy Topping*, No. 2941, Niu Ridge, Island of Oahu, Hawaiian Islands, November 30, 1924 (Calif.).

Distribution: Known only from type locality on Island of Oahu, Hawaiian Islands.

Specimens examined: *Topping* 2941 (type, Calif.); *idem* 3354*a*, a single specimen growing with many *Bidens sandvicensis* plants, dry, open ridge, Niu Ridge, March 2, 1930 (Field); *Degener, Park, & Nitta* 4162, a single plant growing with No. 4161 (*B. sandvicensis*), near base on western side of middle ridge of Niu Valley, June 4, 1932 (Field; Kew).

Nearest apparently to *Bidens pulchella* (Less.) Schz. Bip., the type of which is a complete plant but only about 12 cm. tall, having the several principal leaves tripinnatisect with narrower segments than in *B. obtusiloba* and the achenes distinctly clavate and only about 3 mm. long. A study of *B. obtusiloba* in its juvenile stages is much to be desired.

EXPLANATION OF PLATE XXII

Bidens obtusiloba: a, flowering and fruiting branch, ×0.69; *b,* exterior involucral bract, ×6.9; *c,* interior involucral bract, ×6.9; *d,* ray floret, ×6.9; *e,* palea, ×6.9; *f,* disc floret, ×6.9; *g,* achene, ×6.9; all from type.

37. **Bidens sandvicensis** Less. Linnaea 6: 508. 1831; descript. amplific. Sherff, Bot. Gaz. 76: 161. 1923. Pl. XXIII, figs. *a–h.*

Bidens mutica Nutt. Trans. Amer. Phil. Soc. ser. 2, 7: 368. 1834.

Campylotheca mutica (Nutt.) Walp. Repert. 2: 618. 1843.

Campylotheca sandvicensis (Less.) Hillebr. Fl. Haw. Isls. 211, 214. 1888.

Campylotheca macrocarpa var. γ. Hillebr. op. cit. 215.

Coreopsis sandwicensis Benth. & Hook. ex Drake del Castillo, Ill. Fl. Ins. Mar. Pacif. 210. 1890.

Bidens sandvicensis var. *typica* Sherff, Bot. Gaz. 88: 296. 1929.

a. Folia principalia plerumque bipinnatisecta vel (saepe ternatim) bipinnata.....var. *α. typica* f. 1. *compositior.*

a. Folia principalia plerumque pinnata.

b. Achaenia faciebus omnino perspicue setosa, marginum setis longis et valde patentibus .....var. *β. setosa.*

b. Achaenia faciebus glabra vel apicem versus sparsissime erecto-setosa, marginibus moderate erecto-setosa, apice aristata vel (etiam primo) exaristata.

c. Foliorum segmenta plerumque tantum 3–6 mm. lata.
var. γ. *imminuta.*

c. Foliorum segmenta plerumque 6–15 mm. lata.
B. sandvicensis sensu stricto.

Caulis herbaceus, erectus, quadrangulatus, sulcato-striatus, glaber. Folia tenuiter petiolata petiolis usque ad 4 cm. longis, petiolo adjecto 3–12 cm. longa, pinnatim 3–5-partita; foliolis ovatis vel saepius ovato-lanceolatis, acuminatis, serratis, glabris, membranaceis, subtus pallidioribus, lateralibus plerumque manifeste petiolulatis 1–4

cm. longis et 5–12 mm. latis (inferioribus rarissime rursus 3–5-partitis), terminali longiore. Capitula radiata, pansa ad anthesin 11–14 mm. lata et 4–6 mm. alta, in paniculis corymboideis trichotomis subfastigiatis disposita, ramis rigidis folia sua longe excedentibus. Involucri bracteae exteriores 4–6, lineares, glabratae, obtuse acriterve calloso-apiculatae, 2–5 mm. longae, interiores lanceolatae longiores. Flores ligulati circ. 5, lutei, ligula moderate vel late elliptico-oblongi, apice denticulati, 6–8 mm. longi. Achaenia linearia, obcompressa, exalata, parce curvata, non perspicue attenuata, atra, faciebus glabra vel apicem versus sparsissime erecto-setosa et circ. 4-sulcata, marginibus erecto-setosa, corpore 6–9 mm. longa et 0.5–0.8 mm. lata, apice nunc biaristata aristis retrorsum et solum apice hamosis circ. 1 mm. longis, nunc subaristata vel etiam exaristata sed setis erectis coronata.

Type specimen: Collected by *Adelbert Von Chamisso*, Island of Oahu, Hawaiian Islands, in 1816 (Berl.).

Distribution: Islands of Kauai, Oahu, Maui, and Hawaii, Hawaiian Islands.

Specimens examined: *Otto Degener* 2095, dry, sunny slope, Mt. Tantalus, Honolulu, Oahu, December 2, 1922 (Field, 2 sheets); *idem* 2672, wind-swept, exposed ridge, northeast slope of Nuuanu Pali, Oahu, February 6, 1928 (Berl.; Brit.; Field, 2 sheets; N.Y.); *idem* 2673, moist, shrubby slope, Upper Pauoa Flats, Oahu, February 25, 1928 (Berl.; Brit.; Field; Kew; N.Y.; forma); *idem* 2677*a*, sunny slopes from Woodlawn along east rim of Manoa Valley toward Mt. Olympus, Oahu, February 28, 1928 (Field, 2 sheets; N.Y.); *idem & Kazuto Nitta* 3410, alt. 450 meters, moderately dry slope, east rim of Manoa Valley (1 mile mauka of University), Oahu, January 13, 1929 (Berl.; Boiss.; Brit.; Field, 2 sheets; Kew; Mun.; N.Y.); *iidem* 3411, open slope, eodem loco et tempore (Berl.; Boiss.; Field, 2 sheets; Kew; Mun.; N.Y.; U.S.); *iidem* 3412, very much wind-swept, sparingly wooded slope, rim of Manoa Valley (1.5 mile mauka of University), January 13, 1929 (Berl.; Field; Kew; N.Y.); *Otto Degener & K. K. Park* 4085, alt. 330 meters, dry, exposed, grassy slope on elevation on Wilhelmina Rise Ridge, Oahu, November 11, 1931 (Field; Gray); *iidem* 4087, eodem loco et tempore (Berl.; Brit.; Field; Gray; Kew; U.S.); *iidem* 4088, dry, shady, grassy slope, eodem loco et tempore (Berl.; Brit.; Field; Gray; Mo.); *iidem* 4089, eodem loco et tempore (Berl.; Brit.; Calif.; Field, pro parte, aliter var. *typica* f. *compositior;* Gray; Kew; Mo.; Par.; U.S.); *iidem & Y. Nitta* 4161, open forest on western side of middle ridge of Niu

Valley, Oahu, June 4, 1932 (Berl.; Calif.; Field; Gray; Kew; Mo.; Mun.; N.Y.; U.V.); *Degener, Hamilton Rodrigues, & Noel Krauss* 3530, very wet, wooded slope, cliffs below and east of Nuuanu Pali, Oahu, January 20, 1929 (Berl.; Brit.; Field; Kew; N.Y.); *Degener, Takamoto, & Martinez* 10536, rare, on grass- and weed-covered slope, talus southwest of Waimanalo Landing, Oahu, April 10, 1936 (Field); *Degener, Topping, & Shigeura* 10067, open, wooded slope, Manoa Cliff Trail, Oahu, November 20, 1935 (Field); *Degener & Henry Wiebke* 2601, exposed slope northeast of Nuuanu Valley, Oahu, November 20, 1926 (Field; N.Y.); *iidem* 2671, on way from Manoa Valley up to Mt. Olympus, Oahu, January 9, 1927 (Field; N.Y.); *F. R. Fosberg* 9288, alt. 440 meters, dry forest, Manoa-Palolo Ridge, Oahu, March 19, 1933 (Field); *idem* 9298, alt. 340 meters, dry slope, ridge above Woodlawn, Manoa, Oahu, March 19, 1933 (Field); *idem* 10743, suffrutescent herb, 0.5 meters tall, alt. 400 meters, steep open slope, lower slopes of Puu Konahuanui above Nuuanu Pali Road, Kailua, Oahu, January 5, 1935 (Field); *idem* 10736, suffrutescent herb 1 meter tall, alt. 400 meters, lower slopes of Puu Konahuanui above Nuuanu Pali Road, Kailua, Oahu, January 5, 1935 (Field); *Gaudichaud*, Hawaiian Isls. (Berl., 2 sheets); *idem* (*Voy. la Bonite*), eodem loco, October, 1836 (Del., 2 sheets); *idem* (*Voy. la Bonite*) 220 pro parte et 221 pro parte, eodem loco, September–October, 1836 (Par.); *A. A. Heller* 2894, Nuuanu Pali, Oahu, October 29, 1895 (Calif.; Field; Mo.; N.Y.; U.S.); *William Hillebrand*, Oahu (Berl., 2 sheets; Brit.; Kew);[1] *idem* 42, Maui (Kew); *idem* (similiter) 42, Kokolau, Hawaii (Kew); *Kastalsky*, Oahu (Oxf.); (*Mann & Brigham* 428, once referred to *B. sandvicensis*, is *B. conjuncta;*) *iidem* 541, alt. 600–900 meters, Waimea, Kauai (Bish.; Boiss.; Brit.; Corn.; Mo.); *Thomas Nuttall*, in fields, Oahu (type of *Bidens mutica* Nutt.; Brit.); *K. K. Park & D. L. Topping* (*Degener* distrib. No.) 10074, grassy slope, Kuliouou Valley, Oahu, June 23, 1935 (Field); *J. Remy* 279, Oahu, 1851–1855 (Par.); *idem* 283, Oahu, 1851–1855 (Gray, 2 sheets; Par.); *Seemann* 2268, Oahu, 1850 (Kew); *Harold St. John* 12983, herbs 2–3 ft. tall, alt. 360 meters, lower woods, Manoa-Palolo Ridge, Oahu, March 26, 1933 (Bish.; Field); *idem & F. R. Fosberg* 13454 et 13459, bush 2 ft. tall, alt. 330 meters, dry, open ridge, Hoary Head Range, Laaukahi,

[1] The sheet at British Museum of Natural History was labeled "*Campylotheca macrocarpa* Gray γ. var. Hab. Niu, Makaleha, Oahu." It is clearly an original specimen of Hillebrand's var. γ. (Fl. Haw. Isls. 215. 1888). Unfortunately the upper half of the sheet had been cut away and was missing, so that a specimen only from Niu or only from Makaleha was seen by me. In Berlin, the Niu sheet is labeled *C. macrocarpa* var. γ., while the Makaleha sheet, though bearing identical material, is labeled *C. macrocarpa.*

BIDENS ASPLENIOIDES Sherff (figs. *a–f*)
BIDENS STOKESII Sherff (figs. *g–o*)

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Koloa, Kauai, December 22, 1933 (Field); *iidem* 13465, alt. 270 meters, eodem loco et tempore (Bish.; Field); *Swezey* (*Degener* distrib. No.) 4205, barren ridge, Milolii, Kauai, July 2, 1932 (Berl.; Field; Gray; Kew; *B. micranthae* var. *caducae* adpropinquans); *idem* (*Degener* distrib. No.) 4206 pro parte, Kokee region, Kauai, July, 1932 (Field; Kew; forma var. *imminutae* adpropinquans); *D. L. Topping* 3354 p.p., growing 0.5–3 ft. high, alt. 300–600 meters, dry, open ridge, Niu Ridge, Oahu, March 2, 1930 (Berl.; Boiss.; Brit.; Field, 3 sheets; Gray; Kew; Mo.; Mun.; Par.; U.S.; pro parte forma *compositior* Deg. & Sherff, q.v.); *idem* 3763, shrubby hillside, Kuliouou, Oahu, August 5, 1934 (Field).

For many years (cf. Sherff, loc. cit.) writers have confused various other Hawaiian species of *Bidens* with *B. sandvicensis* Less. Space permits only the more important of such errors to be noticed here. In 1836, DeCandolle (Prodr. 5: 598) equated *B. sandvicensis* Less. with *B. peduncularis* Gaud. In 1856, Miquel (Fl. Ned. 2: 78) likewise equated these two species. In the Berlin Herbarium are certain Sandwich (Hawaiian) Island specimens sent by Gaudichaud as *B. peduncularis*, and these specimens are close to *B. sandvicensis*, but the original description of *B. peduncularis* was published by Gaudichaud from material collected at Rawak of the far distant Molucca Islands, and which in no way could be mistaken for *B. sandvicensis*.[1] In 1861, Gray (Proc. Amer. Acad. 5: 127–128) gave an extended discussion of *B. sandvicensis*, referring to it *B. mutica* Nutt., *B. gracilis* Nutt., *B. pulchella* (Less.) Schz. Bip. (*Adenolepis pulchella* Less.), etc. The type of *B. mutica* (Brit.) matches Lessing's type of *B. sandvicensis* (Berl.) very well.[2] *B. gracilis*, however, is an entirely different species (cf. Sherff, Bot. Gaz. 70: 105. 1920). *B.*

[1] The Paris specimen (Par.) of Gaudichaud's is a mere fragment, but is probably from his type material. It matches his description perfectly. It is true *B. biternata* (Lour.) Merr. & Sherff. So also is the authentic fragment of Gaudichaud's plant found in the Prodromus Herbarium (Del.). Singularly, Miquel (loc. cit.) equated *B. peduncularis* with *B. biternata* (*B. chinensis*), an equation erroneously rejected by O. E. Schulz (Bot. Jahrb. 50, Suppl.: 179. 1914). Gaudichaud's Paris specimen is labeled as coming from the Sandwich Islands (voyage of the corvette Uranie, one of the two vessels used by Freycinet), but *B. biternata* is not known to occur in that part of the world, and the specimen may well have come from Rawak as stated by him when he published the original description. The fragment in the Prodromus Herbarium is indeed labeled as coming from Rawak.

[2] The type of *B. mutica* is very distinct from *Bidens macrocarpa* (*Coreopsis macrocarpa* Gray), to which *B. mutica* was wrongly referred by Hillebrand (Fl. Haw. Isls. 214. 1888) and by Drake del Castillo (Ill. Fl. Ins. Mar. Pacif. 209. 1890).

We may note also that Hillebrand's var. γ. of *Campylotheca macrocarpa* Gray was, likewise, not *Bidens macrocarpa* at all but, as seen from authentic specimens in Berlin (Berl.) and London (Brit.), purely *B. sandvicensis* Less.

pulchella is represented by a single small type specimen in Berlin, and is so different in technical characters that by no stretch of the imagination could it be equated with *B. sandvicensis*. Gray (loc. cit.) suspected *B. angustifolia* Nutt. of belonging to *B. sandvicensis*, and Drake del Castillo (loc. cit.), evidently with Gray's treatment at hand, definitely equated the two species. A study of Nuttall's type (Brit.) shows a plant with more dissected foliage and more slender-awned achenes (*B. micranthoides* Sherff).

Depauperate specimens approach *B. graciloides*.

Bidens sandvicensis var. α. **typica** f. 1. **compositior** Deg. & Sherff ex Sherff, Bot. Gaz. 88: 296. 1929.

A var. *typica* foliis principalibus bipinnatisectis vel (saepe ternatim) bipinnatis differt. Achaenia biaristata aristis usque ad 1 mm. longis vel demum (vel etiam primum) calvis.

Type specimen: Collected by *Otto Degener* and *Kazuto Nitta*, No. 3411*a*, on moderately dry, open slope at altitude of 450 meters, east rim of Manoa Valley, one mile mauka of the University, Island of Oahu, Hawaiian Islands, January 13, 1929 (Field).

Distribution: Known only from type locality on Island of Oahu, Hawaiian Islands.

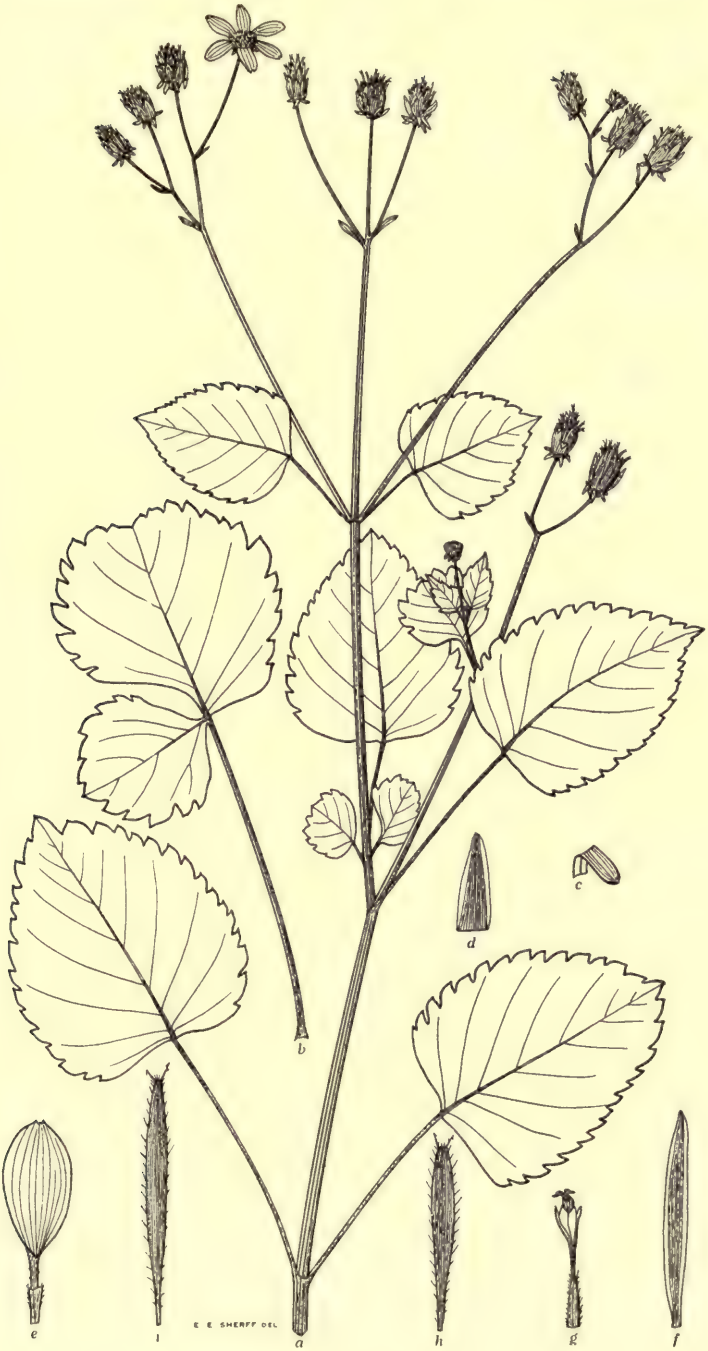
Specimens examined: *Degener & Nitta* 3411*a* (type, Field); *iidem* 3412*a*, much wind-swept, sparingly wooded slope, alt. 600 meters, east rim of Manoa Valley, 1.5 mile mauka of the University, January 13, 1929 (Field); *Degener & Park* 4086, on dry, sunny, windy, grassy slope, alt. 330 meters, elevation on Wilhelmina Rise Ridge, November 11, 1931 (Field; Gray); *iidem* 4090, eodem loco et tempore (Field; Gray); cf. etiam *Topping* 3354 sub specie ipsa (speciminibus pro parte parva hoc aequantibus).

The appearance of an entire plant is rendered strikingly unique by the increased dissection of the leaves. In the case of each number cited, however, the plant had been found growing near plants of the variety *typica*. In the case of No. 3412*a*, furthermore, a small shoot attached to one of the branches bears ordinary pinnate leaves such as characterize var. *typica* proper.

Bidens sandvicensis var. β. **setosa** Sherff, Bot. Gaz. 85: 6. 1928. Pl. XXXIII, figs. *a–l*.

Bidens setosa Sherff, op. cit. 70: 103. 1920.

A specie differt achaeniorum faciebus omnino perspicue setosa, marginum setis longioribus et patentioribus.



BIDENS POPULIFOLIA Sherff

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Type specimen: Collected by *Charles Noyes Forbes*, No. 811*K*, in Waimea Drainage Basin, west side, Island of Kauai, Hawaiian Islands, July 3–August 18, 1917 (Bish., 2 sheets).

Distribution: Islands of Kauai and Hawaii, Hawaiian Islands.

Specimens examined: *Urbain Faurie* 961, Holokele, Hawaii, March, 1910 (Brit.; Del.); *Forbes* 811*K* (2 type sheets, Bish.: cotype, Field).

The type material of *B. setosa*, from the Island of Kauai, was a slightly monstrous or pathological form, as to vegetative parts, and did not match any known species. The singularly hairy achenes were unique and were relied upon as indicating a distinct species. More recently, however, I found in the Delessert Herbarium a specimen from another collection, *Faurie* 961, from the somewhat remote Island of Hawaii. This lacked all traces of any pathological condition. Its floral and achenial characters matched those of the type precisely, but the foliage and growth habit were those of normal *B. sandvicensis* Less.[1] I concluded, therefore, that a varietal rank under *B. sandvicensis* was more nearly expressive of the true status of the *setosa* forms.

Bidens sandvicensis var. γ. **imminuta** Deg. & Sherff ex Sherff, Bot. Gaz. 93: 217. 1932.

Planta ± 1 m. alta, multo ramosa ramis gracillimis. Folia pinnatim 5-partita, foliolis infimis terminalibusque saepe 3-partitis, foliolis indivisis vel foliolorum divisorum segmentis plerumque lineari-lanceolatis saepius tantum 3–6 mm. latis et tantum 1–2.5 cm. longis. Achaenia marginaliter basim versus atque apicem versus moderate erecto-setosa, saepe 1–2-aristata aristis retrorsum hamosis usque ad 1 mm. longis.

Type specimen: Collected by *Otto Degener, K. K. Park, & M. Kwon*, No. 4092, at altitude of 300 meters, on grassy, shrubby plateau, narrow middle Waialae Ridge, Island of Oahu, Hawaiian Islands, November 14, 1931 (Field, 2 sheets).

Distribution: Known only from type locality on Island of Oahu, Hawaiian Islands.

Specimens examined: *Degener, Park, & Kwon* 4092 (2 type sheets, Field: cotypes, Berl.; Boiss.; Brit.; Gray; Kew; Mo.; Par.; U.S.).

A single large plant observed in the field by the collectors yielded upwards of a dozen sheets of herbarium specimens. The general

[1] The achenes were mostly exaristate or shortly aristate. The duplicate in the British Museum of Natural History, however, had the achenes mostly very distinctly biaristate with aristae retrorsely barbed and about 1 mm. long.

aspect of a flowering branch is suggestive of *Bidens micranthoides*, a species which grows only about 2–5 dm. high.

EXPLANATION OF PLATE XXIII, FIGS. *a–h*

Bidens sandvicensis: a, flowering and fruiting branch, ×0.6; *b*, exterior involucral bract, ×3.6; *c*, interior involucral bract, ×3.6; *d*, ray corolla, ×3.6; *e*, palea, ×3.6; *f*, disc floret, ×3.6; *g* (aristate), *h* (exaristate), achenes, ×3.6; all from type.

EXPLANATION OF PLATE XXXIII, FIGS. *a–l*

Bidens sandvicensis var. *setosa: a*, *b*, *c*, various cauline leaves, ×0.58; *d*, portion of inflorescence, ×0.58; *e*, exterior involucral bract, ×5.78; *f*, interior involucral bract, ×5.78; *g*, ray corolla, ×5.78; *h*, palea, ×5.78; *i*, disc floret, ×5.78; *j–l*, achenes, ×5.78; all from 1st type sheet.

38. **Bidens conjuncta** Sherff, Bot. Gaz. 76: 162. 1923.
Pl. XXIV, figs. *a–h*.

Caulis ramique herbacei, perspicue quadrangulati, sulcato-striati, glabri, 5–8 (vel etiam usque ad 15) dm. alti. Folia tenuiter petiolata petiolis plerumque 2–4.5 cm. longis, petiolo adjecto 5–14 cm. longa, ternatim vel pinnatim 3–5-partita, foliolis glabris, subtus pallidioribus, acriter serratis dentibus perspicue apiculatis, ovato-lanceolatis, acuminatis, lateralibus non (nisi interdum inferioribus) petiolulatis sed sessilibus itaque plerumque conjunctis, quam terminali brevioribus. Capitula radiata, pansa ad anthesin 1.2–2 cm. lata et 6–8 mm. alta, in paniculis corymboideis trichotomis disposita, ramis rigidis folia sua longe excedentibus. Involucri bracteae exteriores circ. 5, lineares, acutae obtusaeve, patentes vel reflexae, glabrae vel hispidae, 2–5 vel saepe etiam usque ad 7 mm. longae, interioribus lanceolatis plerumque longiores. Flores ligulati circ. 5, lutei, ligula elliptico-oblanceolati, apice denticulati, 6–10 mm. longi. Achaenia linearia, obcompressa, exalata, plus minusve curvata, parce attenuata, nigrescentia, faciebus glabra et circ. 4-sulcata, marginibus glabra vel rarius sparsim erecto-setosa, corpore 10–16.5 mm. longa et circ. 1 mm. lata, nunc ad vel infra apicem aristata aristis crassis vel tenuibus saepe apicem versus retrorsum hamosis usque ad circ. 3 mm. longis, nunc subaristata vel etiam exaristata sed saepe setis erectis brevibus paucis coronata.

Type specimen: Collected by *Charles Noyes Forbes*, No. 468*M*, Honokahau Drainage Basin, Island of Maui, Hawaiian Islands, September 25–October 17, 1917 (Bish., 2 sheets).

BIDENS SKOTTSBERGII Sherff

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Distribution: Islands of Oahu and Maui, Hawaiian Islands.

Specimens examined: *Otto Degener & Henry Wiebke* 2164, in damp scrub near timber line, Mt. Eke, Maui, August 30, 1927 (Berl.; Field, 3 sheets; Kew; Par.); *iidem* 2178, in exposed bog and light woods, near summit, Mt. Eke, August 29, 1927 (Field, 5 sheets); *C. N. Forbes* 468*M* (type, Bish., 2 sheets); *H. Mann & W. T. Brigham* 428, ridge east of Nuuanu, Oahu (Bish., 2 sheets).

This species, obtained by the late *C. N. Forbes* (cf. Sherff, Bot. Gaz. 70: 98. 1920), might easily be confused with *Bidens sandvicensis* Less., the general habit of the two being very similar. In fact, as remarked in a former paper (Bot. Gaz. 85: 26. 1928), *B. conjuncta* may perhaps prove to be only a variety of *B. sandvicensis*. *B. conjuncta*, however, appears to be fairly distinct in its usually larger leaves with commonly sessile lateral leaflets, its larger and more conspicuous external involucral bracts, its longer ray flowers, and its larger achenes.

EXPLANATION OF PLATE XXIV, FIGS. *a–h*

Bidens conjuncta: a, cauline leaf, ×0.41; *b*, exterior involucral bract, ×6; *c*, interior involucral bract, ×6; *d*, ray corolla, ×3.6; *e*, palea, ×3.6; *f*, disc floret, ×9; *g*, *h*, achenes, ×3.6; all from 1st type specimen.

39. **Bidens Wiebkei** Sherff, Bot. Gaz. 86: 435 and *pl. 14*. 1928. Pl. XXV.

Erecta, glabra, infra demum fruticosa supra herbacea, usque ad circ. 1 m. alta, ramis acriter tetragonis et siccis plus minusve purpurascentibus. Folia petiolata petiolis tenuibus plerumque 2–4.5 cm. longis, petiolo adjecto usque ad 1.3 dm. longa, 3- vel 5-partita, foliolis membranaceis, lanceolatis, acriter serratis, imis 5-partitorum saepe breviter petiolulatis, terminali moderate acuminato. Capitula numerosa in inflorescentia corymboidea, tenuiter pedicellata pedicellis fere glabris, radiata, pansa ad anthesin 1–2 cm. lata et circ. 4.5–6 mm. alta. Involucri bracteae exteriores 4–6, patentes vel suberectae, lineares, apice subobtusae, tergo saepe hispidulae, 2–3 mm. longae; interiores lanceolatae, plerumque 3–4.5 mm. longae. Flores ligulati 4–6, flavidi, ligula oblongi vel late elliptico-oblanceolati, apice circ. 3-denticulati, 5–9 mm. longi. Achaenia demum nigra, valde obcompressa, curvata vel saepius etiam per 1–2.5 convolutiones torta, marginata vel alata marginibus glabris vel sparsissime erecto-setosis nunc multo infra nunc ad corporis apicem in 1 vel 2 filiformes remote retrorsumque hamosas usque ad 1.5 mm.

longas aristas productis vel saepius non productis, corpore faciebus glabro vel sparsim erecto-setoso, nitido, 6–8 mm. longo et 0.9–1.2 mm. lato.

Type specimen: Collected by *Otto Degener* and *Henry Wiebke*, No. 3005, in scrub vegetation, upper part of Halawaiki Gulch, Island of Molokai, Hawaiian Islands, June 21, 1928 (Field, 3 sheets).

Distribution: Known only from type locality on Island of Molokai, Hawaiian Islands.

Specimens examined: *Degener & Wiebke* 3005 (type, Field, 3 sheets: cotypes, Berl.; Boiss.; Brit.; Mun.; Mus. V.; N.Y.).

Allied to *Bidens sandvicensis* Less., a species unknown in its typical state except from the islands of Kauai, Oahu, Maui, and Hawaii.

The species was named for *Mr. Henry Wiebke*, who, as a student under *Mr. Otto Degener*, aided in collecting native Hawaiian plants for taxonomic study.

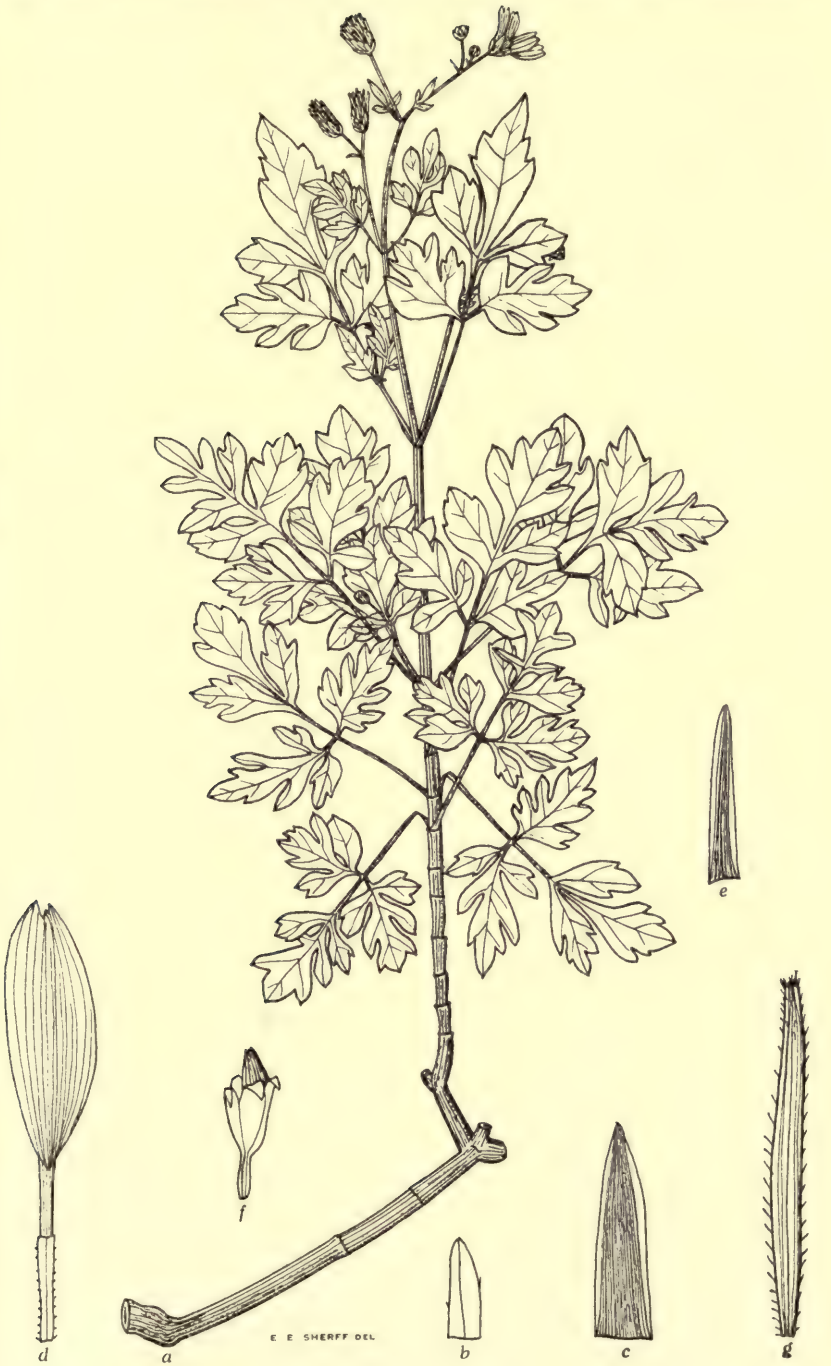
EXPLANATION OF PLATE XXV

Bidens Wiebkei: a, flowering and fruiting branch, ×0.57; *b*, exterior involucral bract, ×3.43; *c*, interior involucral bract, ×3.43; *d*, ray floret, ×2.86; *e*, palea, ×3.43; *f*, disc floret, ×5.71; *g*, *h*, achenes, ×3.43; all from cotype in Hb. Mus. V.

40. **Bidens fecunda** Deg. & Sherff ex Sherff, Bot. Gaz. 93: 217. 1932.

Bidens ferax Deg. & Sherff ex Sherff, op. cit. 94: 590. 1933.

Fruticosa, erecta, glabra, ± 1 m. alta, ramis tetragonis. Folia petiolata petiolis tenuibus 1–6 cm. longis, petiolo adjecto 6–15 cm. longa, pinnata; majora 5-partita, foliolis lanceolatis vel ovato-lanceolatis, acriter serratis vel paucis undulato-integris, apice acutis vel acuminatis, membranaceis, inferioribus tenuiter petiolulatis; minora saepius 3-partita foliolis non dissimilibus nisi lateralibus saepe sessilibus. Capitula plerumque numerosissima, plus minusve paniculato-corymbosa, tenuiter pedicellata pedicellis glabratis, pansa ad anthesin 1.5–2 cm. lata et circ. 6–7 mm. alta. Involucri bracteae exteriores circ. 5 vel 6, tenuiter lineari-oblongae, sparsim hispidae et ciliatae, apice obtusae, circ. 2.5–3 mm. longae, quam interiores anguste oblongae apicaliter pubescentes dimidio breviores. Flores ligulati 4–6, flavi, ligula elliptico-oblongi vel oblanceolato-obovati, apice denticulati vel raro inciso-lobulati, 1–1.3 cm. longi. Paleae lineares, superne saepius attenuatae ac demum coloratae, usque ad 9 mm. longae, achaeniis maturis multo superatae. Achaenia pauca (plerumque 8–12), parce patentia, tenuissime oblongo-linearia, valde obcompressa vel interdum tetragona, nigra, faciebus 4-sulcatis



BIDENS OBTUSILOBA Sherff

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(4 faciebus 2-sulcatis) glabra, marginibus glabra vel sparsim erecto-setosa, corpore longiora demum 1–1.3 cm. longa et circ. 0.5–0.7 mm. lata, sub apice (rarius ad apicem) plus minusve erecto-setosa saepe 1–2 (raro 3) -aristata aristis acriter retrorsumque hamosis usque ad 1 mm. longis.

Type specimen: Collected by *Otto Degener, Kwan Kee Park,* and *William Bush,* No. 4098, on cliffs and less often on grassy and shrubby slopes, deep, precipitous gully on north central side of Kahanahaiki Valley, Island of Oahu, Hawaiian Islands, November 28, 1931 (Field, 4 sheets).

Distribution: Extreme western part of Island of Oahu, Hawaiian Islands.

Specimens examined: *Otto Degener,* Keaau Valley, February 7, 1932 (Berl.; Field, 2 sheets; Goth.; Gray; Kew); *idem & Park* 4095, near dry, partly shaded stream bed, first large side valley on south of Makua Valley, September 7, 1931 (Berl.; Field; Kew); *iidem & William Bush* 4096, on dry cliffs and less often on grassy slopes, narrow northeast gully in Ohikilolo Valley, November 29, 1931 (Berl.; Field; Gray; Mo.); *iidem* 4098 (type, Field, 4 sheets: cotypes, Berl.; Boiss.; Brit.; Calif.; Gray; Kew; Mo.; Mun.; Mus. V.; N.Y.; Par.; U.S.; U.V.); *iidem* 4105, rare on moderately dry, grassy slope, south crest of prominent side gully on southeast side of Keawaula Valley and directly north of Kahanahaiki Valley, November 28, 1931 (Field; Gray); *Degener, Park, & Kwon* 4108, dry, grassy ledges and slopes, southern slope of Kahanahaiki Valley, November 1, 1931 (Berl.; Boiss.; Brit.; Calif.; Field, 2 sheets; Gray; Kew; Mo.; Mun.; Mus. V.; N.Y.; Par.); *Degener, Park, Nitta, & Westgate* 4117, dry, grassy slope one-fourth mile from shore on south side of Keaau Valley, March 23, 1932 (Berl.; Brit.; Field, 2 sheets; Gray; Kew; Mun.; type collection of *B. ferax* Deg. & Sherff).

Of the specimens cited here for *B. fecunda,* we may note *Degener* et al. 4105 in particular. It was found growing within 20 feet of *B. torta* and also of several plants (4102, Field: 4103, Brit.; Field: 4104, Field; Gray) which were clearly hybrids between the two species. These hybrids resemble *B. torta* in having the achenes spirally more or less twisted, although the twisting is much less regular than in *B. torta.* In other respects the resemblance to *B. fecunda* is much stronger.

41. **Bidens coartata** Sherff, Bot. Gaz. 86: 436. 1928. Pl. XXVI.

Perennis, infra fruticosa, ± 5 dm. alta, ramosa, caule ramisque tetragonis, glabris. Folia petiolata petiolis tenuibus usque ad 6 cm.

longis, petiolo adjecto usque ad 1.5 dm. longa, pinnatim 3 (–5)-partita, foliolis ovatis vel lanceolatis, membranaceis, acriter dentibus calloso-apiculatis serratis, glabris atque eciliatis, imis saepe ad marginem inferiorem plus minusve irregulariter divisis, terminali apice breviter acuminato. Capitula subnumerosa et saepe in inflorescentia densa subcorymboideaque coartata, radiata, pansa ad anthesin circ. 1.5 cm. lata et 6–8 mm. alta. Involucri bracteae glabrae vel glabratae, exteriores circ. 5–7, lineares, apice subobtusae, circ. 3 mm. longae; interiores lanceolatae paulo longiores. Flores ligulati plerumque 5, flavidi, ligula late oblanceolato-elliptici, apice subintegri, circ. 7–10 mm. longi. Achaenia anguste linearia, nigra, exalata, plana, recta vel moderate torta, faciebus glabrata et leviter paucistriata, marginibus sparsim suberecto-hispida, apice aegre spinulosa sed exaristata, corpore 7–10 mm. longa et 0.6–1 mm. lata, demum quam paleae manifeste longiora vel saepius breviora.

Type specimen: Collected by *Otto Degener*, No. 2677*b*, on sunny slopes from Woodlawn along east rim of Manoa Valley toward Mt. Olympus, Island of Oahu, Hawaiian Islands, February 28, 1928 (Field, 2 sheets).

Distribution: Known only from type locality on Island of Oahu, Hawaiian Islands.

Specimens examined: *Degener* 2676, two-thirds the way up to Mt. Olympus by way of Pauoa Flats, February 25, 1928 (Brit.; Field; N.Y.); *idem* 2677*b* (2 type sheets, Field: cotypes, Berl.; Brit.; N.Y.); *idem*, *Hamilton Rodrigues, & Noel Krauss* 3529, alt. 600 meters, sunny, shrub-covered embankment, east ridge of Manoa Valley, February 3, 1929 (Berl.; Brit.; Field; Kew; N.Y.); *A. A. Heller* 1988 p.p., in Nuuanu, March 23, 1895 (Calif.; Field; U.S.).

EXPLANATION OF PLATE XXVI

Bidens coartata: a, flowering and fruiting branch, ×0.61; *b*, exterior involucral bract, ×6.08; *c*, interior involucral bract, ×6.08; *d*, ray corolla, ×6.08; *e*, *f*, paleae, ×3.04; *g*, disc floret, ×6.08; *h*, *i*, achenes, ×3.65; all from *Degener*, *Rodrigues*, and *Krauss* 3529, in Hb. Field.

42. **Bidens Salicoides** Sherff, Bot. Gaz. 86: 437 and *pl. 15*. 1928. Pl. XXVII.

Fruticosa, erecta, glabra, ramosa, ± 6 dm. alta, caule ramisque plus minusve tetragonis. Folia petiolata petiolis tenuibus usque ad 5 cm. longis, petiolo adjecto usque ad circ. 1.5 dm. longa, principalia pinnatim sed saepe irregulariter 2–5-partita, foliolis moderate

BIDENS SANDVICENSIS Less. (figs. *a–h*)
BIDENS WAIMEANA Sherff (figs. *i–o*)

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vel late linearibus ac circumambitu foliis nonnullorum specierum *Salicis* nonnihil similibus, integris vel interdum paucidentatis, marginibus saepe parce revolutis, membranaceis, terminali usque ad 8 cm. longo et 12 mm. lato, lateralibus plerumque minoribus et sessilibus vel imis subpetiolulatis; summa nunc indivisa, nunc ternata. Capitula subcorymboidea, radiata, pansa ad anthesin ± 1.5 cm. lata et circ. 6–8 mm. alta, graciliter pedicellata pedicellis 1–4 cm. longis. Involucrum glabratum, bracteis exterioribus circ. 6–7, anguste linearibus, apice calloso subacutis, costa mediana atris, circ. 3–4 mm. longis, quam interioribus lanceolato-ovatis paulo brevioribus. Flores ligulati 3 vel 4, forsitan interdum 5, flavidi, lineari-elliptici, apice obsolete denticulati, 1.2–1.4 cm. longi. Achaenia linearia, plana, plumbeo-atra, exalata, recta vel moderate torta, plerumque glabra, faciebus obscure sulcata (pro toto corpore circ. 16 sulcis), corpore 7–10 mm. longa, apice ipso nunc 1- vel 2-aristata aristis nudis usque ad 1 mm. longis, nunc calvis.

Type specimen: Collected by *Henry Wiebke*, No. 3084, arid region, East Ohia, Island of Molokai, Hawaiian Islands, July 17, 1928 (Field, 3 sheets).

Distribution: Known only from type locality on Island of Molokai, Hawaiian Islands.

Specimens examined: *Wiebke* 3084 (3 type sheets, Field: cotypes, Berl.; N.Y.).

The five specimens studied had come from a single plant, the only one found.

EXPLANATION OF PLATE XXVII

Bidens Salicoides: a, flowering and fruiting branch, ×0.56; *b*, exterior involucral bract, ×3.38; *c*, interior involucral bract, ×3.38; *d*, ray floret, ×2.82; *e*, palea, ×3.38; *f*, disc floret, ×5.63; *g* (exterior), *h* (interior), achenes, ×3.38; *a*, from cotype in Hb. Berl.; rest from 1st type sheet.

43. **Bidens Forbesii** Sherff, Bot. Gaz. 70: 103 and *pl. 14*. 1920. Pl. XXVIII.

Herbacea supra, infra fruticosa, caule ramisque tetragona, glabra, usque ad 4.5 m. alta. Folia inferiora magna, tripartita, petiolata petiolis tenuibus 6–8 cm. longis, petiolo adjecto 1–2.5 dm. longa et 5–15 cm. lata, foliolis lanceolatis, longe acuminatis, membranaceis, creberrime serratis dentibus acribus et longe mucronulato-inflexis, 1–1.4 dm. longis et 3.5–5 cm. latis; folia superiora minora, 7–10 cm. longa et 4–5 cm. lata. Capitula parva, supra folia exserta, sub-

corymbosa, pansa ad anthesin 4–5 mm. alta et circ. 1.5 cm. lata. Involucri bracteae exteriores 3–6, anguste lineares, ad apicem acutae, glanduloso-pulverulentae vel fere glabratae, patentes vel reflexae, 1.5–2.5 mm. longae, interiores paulo vel multo longiores. Flores ligulati circ. 5, flavidi, ligula anguste oblongo-obovati, apice valde acriterque 2-dentati, 6–8 mm. longi. Achaenia pro capitulo pauca (10–14), angustissime elongato-linearia, superne attenuata, obcompressa, nigra, faciebus glabris et manifeste 2-sulcata vel obscure 4-sulculata, marginibus sparsim antrorsumque setosa, corpore 1–1.6 cm. longa et sub 0.7 mm. lata, apice setosa et saepius minuto-biaristata aristis saepe patentibus reflexisve nunc subrectis nunc hamiformibus glabris vel retrorsum 1–2-hamosis.

Type specimen: Collected by *Charles Noyes Forbes*, No. 82*K*, Waioli Valley, Island of Kauai, Hawaiian Islands, July 23, 1909 (Bish., 2 sheets).

Distribution: Known only from northern part of Island of Kauai (Waioli to Wainiha), Hawaiian Islands.

Specimens examined: *Urbain Faurie* 993, Wainiha, January, 1910 (Brit.); *Forbes* 82*K* (type, Bish., 2 sheets); *Harold St. John* et alii 10947, alt. 180–450 meters, stream bank, Power Line Trail, Hanalei-Kalihi Kai Ridge, January 1, 1931 (Bish.); *St. John & Fosberg* 13965, shrub 4.5 meters tall, stem 1.9 cm. thick at base, on moist rocks near base of waterfall, alt. 330 meters, side gulch on west side, 0.75 mile upstream from intake, Wainiha Valley, Wainiha, January 1, 1934 (Bish.; Field); *iidem* 13975, plant 8 ft. tall, alt. 300 meters, in moist bottom of woods, same locality and date (Field).

EXPLANATION OF PLATE XXVIII

Bidens Forbesii: a, flowering specimen, ×0.54; *b*, leaf from sterile branch, ×0.54; *c*, exterior involucral bract, ×5.37; *d*, interior involucral bract, ×5.37; *e*, ray corolla, ×5.37; *f*, palea, ×5.37; *g*, disc floret, ×5.37; *h*, very young achene, ×5.37; *i*, mature achene (found detached on, but glued to sheet), ×5.37; *a*, *c–i*, from 1st type sheet; *b*, from 2nd type sheet.

44. **Bidens torta** Sherff, Bot. Gaz. 70: 105. 1920.
Pl. XIII, figs. *a–g*.

Fruticosa, glabra, caule non crassa, 0.5–2.1 m. alta. Folia tenerrime petiolata petiolis 1–4 cm. longis, petiolo adjecto 7–16 cm. longa et 2.5–10 cm. lata, tripartita, membranacea, serrata, ciliata, foliolis acuminatis, terminali multo majore, oblongo-lanceolato, lateralibus sessilibus vel breviter petiolulatis, ovato-lanceolatis. Capitula

BIDENS CONJUNCTA Sherff (figs. *a–h*)
BIDENS FULVESCENS Sherff (figs. *i–o*)

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numerosa, laxe paniculata, mediocria, radiata, pansa ad anthesin circ. 1.7 mm. lata et 5 mm. alta. Involucri bracteae exteriores circ. 5, tenuiter lineares, glanduloso-pubescentes, 1.5–2.5 mm. longae, interioribus paulo breviores. Flores ligulati circ. 5, ligula oblongo-oblanceolati, flavi, ad apicem plus minusve denticulati, circ. 7 mm. longi. Achaenia tenuiter linearia, nigra, maxime torta, glabra, corpore 9–13 mm. longa, ad apicem calva vel obscure 1–2-aristata aristis glabris brevissimis (0.1–0.3 mm. longis).

Type specimen: Collected by *Charles Noyes Forbes*, No. 2092*O*, at Kawailoa, Island of Oahu, Hawaiian Islands, March 2–5, 1915 (Bish.).

Distribution: Known only from Island of Oahu, Hawaiian Islands.

Specimens examined: *E. H. Bryan, Jr.*, 793, erect shrub, 3 meters tall, alt. 540 meters, in small clump of remnant native forest at head of Manini Gulch, Waianae Mts., September 25, 1934 (Bish.; Field); *idem* 827, erect shrub 2–3 meters tall, alt. 2,000 ft., on ridge at edge of rain forest, Kukuiala Valley, October 9, 1934 (Field); *Otto Degener* 4190, becoming 6 ft. high, in woods on summit ridge, 400 ft. west of top of Piko Trail, Makua Valley, July 18, 1932 (Berl.; Calif.; Field; Gray; Kew; Mo.; Mun.; Par.; U.V.); *idem & K. K. Park* 4094, on grassy, shrubby slopes and cliffs, first large side valley on south of Makua Valley, September 7, 1931 (Field, 2 sheets; Gray; Mo.); *iidem & William Bush* 4097, among grass and bushes and on ledges, not in cracks of cliff, narrow northeast gully in Ohikilolo Valley, November 29, 1931 (Berl.; Boiss.; Brit.; Calif.; Field; Gray; Kew; Mo.; Mun.; N.Y.; Par.; U.S.; U.V.); *iidem* 4101, on moderately dry, grassy slopes, prominent side gully on southeast side of Keawaula Valley and directly north of Kahanahaiki Valley, November 28, 1931 (Berl.; Boiss.; Brit.; Field; Gray; Kew; Mo.; N.Y.; Par.; U.S.; U.V.); *iidem & Colin Potter* 10046 pro parte, grassy, shrubby slope, west side of Makaleha Valley, July 21, 1935 (Field); *iidem* 10047, growing up to 7 ft. tall, grassy, shrubby slope, half way between Makaleha Valley and ridge above Makua Valley, same date (Field); *iidem* 10299, partly shaded ridge, east slope of Puu Kaua, January 19, 1936 (Field); *Degener & Takamoto* 10293, rare, on partly wooded ridge, Kawaiiki, February 9, 1936 (Field); *iidem & Martinez* 10537, in sun with *Lantana*, etc., Ekahanui Ridge along Waianae Contour Trail, April 21, 1936 (Field); *F. R. Fosberg & K. Duker* 9044, bush 1.5 meters tall, alt. 510 meters, dry, bushy slope at foot of cliffs, head of Makua Valley, Waianae Range, November 25, 1932 (Berl.; Field; Gray; Kew; N.Y.); *Forbes* 2092*O*

(type, Bish.: cotype, Field); *Martin L. Grant* 7018, alt. 475 meters, in *Acacia-Metrosideros* forest, Kaava-Kamokunui, District of Mokuleia, July 1, 1934 (Field); *idem* 7395, shrub 3 ft. tall, alt. 900 meters, in *Metrosideros* forest, Kalena, District of Waianae, September 30, 1934 (Field); *idem* 7456, shrub 3 ft. tall, alt. 840 meters, Kaala, Waianae District, October 4, 1934 (Field); *Carl Skottsberg* 387, Makaleha Valley, Waianae, August 30, 1922 (Goth.); *Harold St. John* 12250, in tufts on sunny grass slope, alt. 630 meters, Piko Trail, Keaau-Makua Forest Reserve, Waianae Mts., November 25, 1932 (Bish.; Field); *idem & Francis R. Fosberg* 12178, shrub 3–6 ft. tall, in thicket, alt. 600 meters, east ridge of 2nd gulch east of Puu Kaupakuhale, northeast slope of Puu Kaala, Mokuleia, October 23, 1932 (Bish.; Field); *D. L. Topping* 3308, shady hillside, Waimea Canyon, February 3, 1929 (Berl.; Brit.; Field; Kew; N.Y.); *idem & Richard Northwood* (*Degener* distrib. No.) 4330, on partly shaded rocky slope near falls, Waimea Canyon, February 19, 1933 (Field; N.Y.).

The leaves of this species appear to have rather large leaflets in proportion to the thickness of the petiole. The terminal leaflet becomes 1 dm. long and 4.4 cm. wide. The branches of the inflorescence are slender and widely diverging. The leaves and inflorescence combine to give a striking superficial resemblance to certain Central American specimens of *B. squarrosa* H.B.K. The achenes surpass those of nearly or quite all other species in the amount of twisting. The twisting commences early, in the young achene, and the mature achenes are frequently twisted through four or five complete revolutions.

B. torta × B. fecunda.—Specimens collected by Degener, Park, and Bush (4102, Field: 4103, Brit.; Field: 4104, Field; Gray), within 20 feet of both parents,[1] resemble *B. torta* in having the achenes spirally more or less twisted, although the twisting is much less regular than in *B. torta*. In other respects the resemblance to *B. fecunda* is much stronger.

B. torta × B. amplectens.—Certain specimens collected by Degener, Park, and Bush (4100, among bushes, grass, and rocks in dry region, near upper part of trail in Keawaula Valley leading to Kuaokala Forest Reserve, Oahu, November 28, 1931; Field; Gray) were found growing near *B. torta* and *B. amplectens* and are unquestionably hybrids between the two. The general habit is of the latter, but the achenes are more or less bent or curled, showing a very weak

[1] For field data, vide Deg. et al. num. 4101 sub *B. torta* et eosdem num. 4105 sub *B. fecunda*.

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approach to the strongly twisted ones of the former. More recently Mr. Degener has collected many additional plants nearby (at head of Makua Valley, Oahu, April 4, 1932; Berl.; Brit.; Field; Goth.; Gray; Mo.; Mun.; N.Y.; Par.; Phila.; U.S.; U.V.), in which, while the general habit is that of *B. amplectens*, the achenes are practically typical for *B. torta*.

EXPLANATION OF PLATE XIII, FIGS. *a–g*

Bidens torta: a, flowering and fruiting branch, ×0.54; *b*, exterior involucral bract, ×5.43; *c*, interior involucral bract, ×5.43; *d*, ray corolla, ×5.43; *e*, palea, ×5.43; *f*, disc floret, ×5.43; *g*, achene, ×3.26; all from type.

45. **Bidens fulvescens** Sherff, Bot. Gaz. 86: 435. 1928. Pl. XXIV, figs. *i–o*, and Pl. XXIX.

Bidens personans Deg. & Sherff ex Sherff, op. cit. 92: 205. 1931; etiam 94: 589. 1933.

Fruticosa vel subfruticosa, caule ramisque tetragona et glabrata, demum 1.5–2.5 m. alta. Folia petiolata petiolis tenuibus usque ad 9 cm. longis saepe sparsim ciliatis, petiolo adjecto usque ad 2.2 dm. longa, pinnatim 3- vel 5-partita, juniora plerumque pilis numerosis fulvescentibus vel etiam ferrugineis obsita, foliolis ovato-lanceolatis vel rarius etiam anguste oblongo-lanceolatis, apice subobtusis vel breviter acuminatis, margine serratis et ciliatis, demum plus minusve glabratis, supra valde viridibus, infra pallidioribus (venulis numerosis perspicuis coloratis), imis nunc petiolulatis nunc sessilibus. Capitula numerosa corymbo-paniculata, radiata, pansa ad anthesin vix 1 cm. lata et tantum 3.5–5 mm. alta, pedicellis tenuibus, pubescentibus, saepius 0.5–2 cm. longis. Involucri bracteae exteriores circ. 5, lineares vel lineari-oblongae, patentes vel recurvatae, tantum 1–2 (raro –2.5) mm. longae, minute pubescentes vel glabratae, apice subobtusae; interiores lanceolatae 3–4 mm. longae. Flores ligulati plerumque 5, flavidi, ligula late oblanceolati, apice circ. 3-dentati, circ. 5–9 mm. longi. Achaenia linearia, nigra, obcompressa, glabra, spiraliter per 1 vel 1.5 convolutiones torta, circ. 8–12 mm. longa et 0.6–0.8 mm. lata, exaristata vel ad apicem rariter 1 vel 2 setis munita.

Type specimen: Collected by *Otto Degener*, No. 2515, in open woods, north slope of Mt. Kaala, Island of Oahu, Hawaiian Islands, February 11, 1928 (Field, 3 sheets).

Distribution: Known only from Island of Oahu, Hawaiian Islands.

Specimens examined: *William Bush* 32, alt. 360 meters, semi-arid valley, south slopes, Palikea, July 7, 1929 (Berl.; Field; Kew; type collection of *Bidens personans* Deg. & Sherff); *idem* 33, eodem loco et tempore (Field); *Degener* 2515 (type, Field, 3 sheets); *idem* 4196, alt. 600 meters, on weed- and grass-covered slopes in dry region, Pohakea Pass, July 30, 1932 (Berl.; Calif.; Field; Gray; Kew; Mo.; Mun.; N.Y.; Par.; U.V.); *idem & Kwan Kee Park* 4079, along terminal ridge among grass or shrubs, often fog-swept, north of Puumanawahua and south of Palikea, Waianae Range, September 27, 1931 (Berl.; Field; Gray; N.Y.; Par.; Mus. V.); *iidem & Y. Nitta* 4159, alt. 750 meters, on shrub- and grass-covered rocky slope, lateral ridge north of summit ridge where it is about equidistant from Puu Kamaohanui and Puu Pane, June 11, 1932 (Berl.; Boiss.; Brit.; Calif.; Field; Gray; Kew; Mo.; Mun.; N.Y.; Par.); *iidem* 4159*a*, eodem loco et tempore (Field; Kew); *Degener, Park, Iwasaki, & Agliam* 4400, on tree- and bush-covered, rocky canyon wall, Kamokuiki Valley, April 12, 1933 (Berl.; Brit.; Field; Goth.; Gray; Kew; Mo.; N.Y.; Par.; U.S.); *Degener, Park, Iwasaki, & Bush* 4243, northeast slope near summit, small valley immediately southeast of Puu Hapapa, October 30, 1932 (Berl.; Brit.; Del.; Field; Gray; Kew; Mo.; Par.; U.S.); *Degener, Park, & Takamoto* 10115, on dry, *Lantana*-covered ridge, Palehua, Waianae Range, November 23, 1935 (Field); *iidem & Shigeura* 10117, varying forms from dry and from wet sides of ridge, Mauna Kapu, December 16, 1935 (Field, 3 sheets); *Degener, Park, Shigeura, & Topping* 10119, spring-fed talus, Nanakuli Valley below Mauna Kapu, December 1, 1935 (Field; forma foliis juvenilibus subglabris, foliolis circumambitu atypicis); *Degener, Park, & Yamamoto* 4240, along dry stream bed among grass and bushes, small valley southeast of Palikea, October 23, 1932 (Berl.; Brit.; Calif.; Del.; Field; Goth.; Gray; Kew; Mo.; N.Y.; Par.); *iidem* 4241, on ridge northwest of small valley cited for 4240, same date (Berl.; Brit.; Del.; Field; Goth.; Gray; Kew; Mo.; N.Y.; Par.; U.S.); *F. R. Fosberg* 9103, alt. 1,160 meters, wet forest, Puu Kaala, eastern slope of Waianae Mts., Waianaeuka, January 8, 1933 (Field; Goth.; Gray); *idem* 10374, more or less decumbent, wet forest, alt. 1,180 meters, Waianaeuka, November 5, 1933 (Field); *idem* 10382, moist forest, alt. 850 meters, Waianaeuka, November 5, 1933 (Field); *Edward P. Hume* 385, alt. 690 meters, shrub on dry, wooded ridge, Puu Hapapa, December 1, 1931 (Field); *Park, Potter, & Topping* (*Degener* distrib. No.) 10295, summit ridge, Palikea, January 5, 1936 (Field, 3 sheets); *Carl*

Skottsberg 262, alt. 700 meters, Palehua-iki, Waianae, August 23, 1922 (Goth.); *Harold St. John* 13999 and 14000, shrub 0.5–1 ft. tall, alt. 780 meters, main divide northwest of Puu Kanehoa, January 7, 1934 (Field); *idem* 11128, alt. 840 meters, ridge south of Puu Hapapa, October 25, 1931 (Bish.; Field); *D. L. Topping* 3353, alt. 750 meters, open ridge, Puu Kanehoa, July 14, 1929 (Berl.; Boiss.; Brit.; Field, 2 sheets; Kew; Mun.); *Philip Westgate* (*Degener* distrib. No.) 4132, open, moderately dry ridge, main ridge between Palikea and Von Holt's mountain house, April 10, 1932 (Berl.; Field; Gray).

Appears to hybridize with *B. micrantha* var. *kaalana* (q.v.).

EXPLANATION OF PLATE XXIV, FIGS. *i–o*

Bidens fulvescens: i, flowering and fruiting branch, ×0.6; *j*, exterior involucral bract, ×6; *k*, interior involucral bract, ×6; *l*, ray corolla, ×3.6; *m*, palea, ×6; *n*, disc floret, ×9; *o*, achene, ×6; all from cotype of *B. personans* in Hb. Field.

EXPLANATION OF PLATE XXIX

Bidens fulvescens: a, flowering and fruiting specimen, ×0.65; *b*, a lower, 5-partite leaf, ×0.65; *c*, exterior involucral bract, ×6.54; *d*, interior involucral bract, ×6.54; *e*, ray corolla, ×6.54; *f*, palea, ×6.54; *g*, disc floret, ×6.54; *h*, *i*, *j*, achenes, ×3.92; *a–h*, from *Skottsberg* 262, in Hb. Goth.; rest from type material.

46. **Bidens Campylotheca** Schz. Bip. Flora 39: 359. 1856.
Pl. XXX.

Campylotheca grandiflora DC. Prodr. 5: 593. 1836.

Coreopsis Macraei Gray, Proc. Amer. Acad. 5: 126. 1861.

a. Foliola 7–9 ..... var. *β. pentamera* f. 1. *filicifolia.*

a. Foliola usque ad 5.

b. Foliola plerumque 5 ..... var. *β. pentamera* sensu stricto.

b. Foliola rarius 5 ..... *B. Campylotheca* sensu stricto.

Herbacea vel demum fruticosa, usque ad 4.5 meters alta, caule tetragona gracilisque (vel infra interdum 2.5 cm. crassa), ramosa; ramis gracilibus, elongatis (usque ad 1.8 m. longis!), patentibus. Folia petiolata petiolis 1–5 (in foliis plantarum juvenum etiam usque ad 9) cm. longis, petiolo adjecto principalia 1–2.5 dm. longa, nunc indivisa et oblongo-ovata (plantarum juvenum etiam 5–6 cm. lata!) vel oblongo-lanceolata breviter acuminata, nunc tripartita foliolis lanceolatis et acutis vel breviter acuminatis lateralibus subsessilibus, membranacea, puberulo-hirtella vel glabra, moderatim vel creberrime

serrata dentibus saepius acriter apiculatis. Capitula laxissime paniculata paniculo interdum etiam 3 dm. lato, radiata, pansa ad anthesin ± 2 cm. lata et 6–12 mm. alta, pedicellis ultimis minute bracteatis usque ad 8 cm. (supra ramulescentiam) longis. Involucri glabri vel pubescentis bracteae variabiles, plerumque subaequales, 7 vel 8 exteriores lineari-oblongae vel oblanceolatae, apice obtusae, tergo saepe perspicue trinervatae, 4–7 mm. longae, interiores late lanceolatae. Flores ligulati circ. 5 (–8 fide Hillebrandii), flavi, oblongi vel late elliptico-oblanceolati, apice acriter irregulariterque dentati, ± 1 cm. longi. Achaenia lineari-subfusiformia, glaberrima vel superne nonnullis setis erecte setosa, atra, subrecta vel valde et saepe regulariter torta, exalata, ad margines crassa rotundataque, corpore 7–12 mm. longa et 1.4–1.7 mm. lata, apice calva vel irregulariter 1–2-aristata aristis usque ad circ. 1.3 mm. longis, supra retrorsum infra antrorsum obsolete spinulosis.

Type specimen: Collected by *James Macrae* at Mt. Kaah (Mauna Kea), Island of Hawaii, Hawaiian Islands, June, 1825 (Del.).

Distribution: Islands of Oahu, Lanai, and Hawaii, Hawaiian Islands.

Specimens examined: *Otto Degener & Henry Wiebke* 3000, sunny, rocky slope, Punaluu Valley, Oahu, February 20, 1927 (Field, 7 sheets; Haw.); *C. N. Forbes* 195*H*, Hanehane, Kona District, Hawaii, June 17, 1911 (Bish.); *idem* 346*H*, Honomalino, Kona District, Hawaii, July 25, 1911 (Bish., forma plus minusve puberula, quam ob rem typica); *Gaudichaud* (*Voy. la Bonite*) 220 pro parte and 221 pro parte, Hawaiian Isls., October, 1836 (Del.; Par.); *William Hillebrand* 39, Hawaii (Brit.; Kew); *Macrae*, Mt. Kaah, Hawaii, June, 1825 (type, Del.: cotypes, Berl.; Kew); *idem*, Oahu, May, 1825 (Kew); *G. C. Munro* 464, Kaiholena, Lanai, August 16, 1915 (Bish.); *idem* 505, Kohinahina, Lanai, February 12, 1916 (Bish., 3 sheets; Field, 2 sheets); *J. Remy*, Hawaii (N.Y.); *idem* 285, Hawaii, 1851–1855 (Gray, 2 sheets; Par.); *St. John, Coulter, Hashimoto, Lindsay, & Mitchell* 11404, shrub 15 ft. tall, in woods, Puuwaawaa, Hawaii, December 29, 1931 (Bish.; Field).

The specimens collected by Munro on the Island of Lanai are glabrous forms, with the leaflets of the tripartite leaves somewhat wider than in the type material from Oahu or in the Forbes specimen (346*H*) from Hawaii. They do not, however, appear at all separable. Asa Gray's description of the achenes, "calloso-marginatis" (Proc. Amer. Acad. 5: 126. 1861) demands amplification. The mature achenes on *Remy* 287, the specimen studied particularly by Gray,

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are rounded along the two margins and in some cases slightly thinner marginally than in the part nearer the median line. There is no suggestion, however, of wings. Regarding Gray's employment of the new trivial name *Macraei* I have already written in another place (Bot. Gaz. 70: 93. 1920; cf. ante, p. 19).

The reason for DeCandolle's use of the name *grandiflora* is not apparent, for the flowering heads are only of average width when compared with those of other Hawaiian species.

Bidens Campylotheca var. *β.* **pentamera** Sherff,
Bot. Gaz. 85: 4. 1928.

Folia principalia plerumque 5-partita, jugi inferioris foliolis lanceolatis, sessilibus vel vix petiolulatis, circ. 5–6.6 cm. longis et 1.4–2.9 cm. latis; capitulis pansis ad anthesin 3–4 cm. latis; floribus ligulatis circ. 8, ligulis linearibus. Achaenia torta, non nisi ad apicem setosa, exaristata vel rariter obsolete aristata 1 vel 2 aristis minutis, glabris, etiam infra apicem positis et in achaeniorum margines decurrentibus.

Type specimen: Collected by *Otto Degener* and *Henry Wiebke*, No. 2163, fog-swept medium forest in Koolau Gap, Haleakala Crater, Island of Maui, Hawaiian Islands, August 11, 1927 (Field).

Distribution: Known only from type locality, Haleakala Crater, Island of Maui, Hawaiian Islands.

Specimens examined: *Otto Degener & Henry Wiebke* 2163 (type and cotypes, Field: cotypes, Berl.; Brit.; Haw.; Kew; Par., etc.); *iidem* 2177 pro parte, wet, open forest in fog belt, Koolau Gap, Haleakala Crater, August 11, 1927 (Field); *Joseph F. Rock* 8633, Haleakala Crater, October, 1910 (Gray).

Bidens Campylotheca var. *β.* **pentamera** f. 1. **filicifolia**
Sherff, loc. cit.

E varietate foliis 7–9-foliolatis, foliolis terminalibus et basalibus saepe irregulariter 2–5-partitis, aliis simplicibus differt.

Type specimen: Collected by *Otto Degener* and *Henry Wiebke*, No. 2177 pro parte, Koolau Gap, Haleakala Crater, Island of Maui, Hawaiian Islands, August 11, 1927 (Field, 3 sheets).

Distribution: Known only from type locality, Haleakala, Island of Maui, Hawaiian Islands.

Specimens examined: *Degener & Wiebke* 2169, on arid cliffs near spring, between Crater House and Koolau Gap, August 18, 1927 (Field); *iidem* 2177 pro parte (type, Field, 3 sheets: cotype, Haw.,

2 sheets); *A. S. Hitchcock* 14985, alt. 1800–3000 meters, moist, shady cliff, Haleakala Crater, October 2–5, 1916 (U.S.).

One specimen of *Degener & Wiebke* 2177 is typical for the var. *pentamera*, but the remaining specimens differ conspicuously in having 7–9 leaflets, the terminal one and the two of the basal pair often irregularly 2–5-parted. In view of the pronounced endemism of Hawaiian plants, it seemed wise to interpret this distinction as connoting a definite forma of *B. Campylotheca* var. *pentamera*. Such interpretation was later given added force by the finding of the Hitchcock plant, which had been collected some eleven years earlier but matched the type very closely.

EXPLANATION OF PLATE XXX

Bidens Campylotheca: a, branch with subflowering and subfruiting heads, ×0.55; *b*, *c*, additional leaves, ×0.55; *d*, exterior involucral bract, ×3.3; *e*, interior involucral bract, ×3.3; *f*, palea, ×3.3; *g*, disc floret, ×3.3; *h*, achene, ×3.3; all from *Munro* 505, 3 sheets in Hb. Bish.

47. **Bidens nematocera** Sherff, Amer. Journ. Bot. 22: 705. 1935.
Campylotheca grandiflora var. β. Hillebr. Fl. Haw. Isls. 215. 1888.
Bidens Campylotheca var. *nematocera* Sherff, Bot. Gaz. 85: 7. 1928.

Plus minusve herbacea, glabra, ramosa ramis adscendentibus tetragonis. Folia tenuiter petiolata inferiora (petiolo usque ad 9.5 cm. longo adjecto) usque ad 21 cm. longa, summa indivisa cetera pinnatim 3–5-partita foliolis acriter serratis membranaceis ovato-oblongis ad basim cuneatis et imis plerumque petiolulatis apice breviter acuminatis terminali usque ad 11.5 cm. longo et ad 4.4 cm. lato; mediana (petiolo circ. 2–4 cm. longo adjecto) ± 1 dm. longa, foliolis vix angustioribus. Capitula corymboso-paniculata, tenuiter pedicellata pedicellis subsparsim hispidis 1–2.5 cm. longis, radiata, pansa ad anthesin 2.6–3.1 cm. lata et circ. 8–9 mm. alta. Involucri laxe glanduloso-hispiduli bracteae exteriores circ. 6, oblongo-lineares, inferne saepe angustatae, apice subobtusae, demum plerumque reflexae, 2–3.5 mm. longae; interiores ovato-oblongae circ. 5–6 mm. longae. Flores ligulati 5 (–8 fide Hillebrandii), flavi, ligula obovato-oblongi, apice 2–3-denticulati, 1.5–1.7 cm. longi. Achaenia atra, lineari-oblonga, aegre torta et arcuata, utrinque perspicue mediano-costata, ciliata, corpore usque ad 1 cm. longa et circ. 1–1.2 mm. lata, apice biaristata aristis longis (4 mm.) filiformibus interdum deciduis erecte retrorsumque hamosis.

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Type specimen: Collected by *William Hillebrand*, Waikolu, Island of Molokai, Hawaiian Islands (Berl., 2 sheets).

Distribution: Known only from type locality on Island of Molokai, Hawaiian Islands.

Specimens examined: *William Hillebrand*, Waikolu (2 type sheets, Berl.).

One type sheet bears a sterile, more or less basal shoot, with large leaves very similar to those of *Bidens Campylotheca* of Oahu, Lanai, and Hawaii. The achenes and the habit of the inflorescence, as shown by the copious flowering and fruiting material on the other sheet, are, however, entirely distinct.

48. **Bidens valida** Sherff, Bot. Gaz. 70: 102. 1920. Pl. XXXI.

Supra herbacea, infra verisimiliter fruticosa, glabra; caule tetragono, valido, ± 7 dm. alto. Folia (exsiccata) atra supra, acriter serrata, non ciliata, petiolata petiolis tenuibus usque ad 5 cm. longis, petiolo adjecto 4–15 cm. longa; superiora indivisa ovata vel ovato-lanceolata, abrupte acuminata, 2–6 cm. lata; inferiora tripartita (vel interdum 5-partita ?— tantum unum inferius vidi), foliolis lanceolatis, acuminatis. Capitula pauca, corymbosa, solitaria in pedunculis subtenuibus, majuscula, involucro ad anthesin circ. 6 mm. alto et (supra) 11 mm. lato, demum circ. 1.4 cm. alto et (supra) 1.2–3 cm. lato; pedunculis saepe bracteatis, 2–11 cm. longis. Involucri bracteae exteriores 7 vel 8, foliosae, obtuse oblongo-lanceolatae, glabrae, apice obscure induratae, demum 1.5–1.8 cm. longae et 2–3 mm. latae, interioribus longiores. Flores ligulati non observati. Achaenia linearia, nigra, exalata, glabra vel sparsim setoso-hispida, apice proprio exaristata, plerumque sub apice biaristata aristis brevibus et retrorsum (1–3 setis) hispidis, corpore 8–13 mm. longa.

Type specimen: Collected by *Charles Noyes Forbes*, No. 27*K*, at Hanopu near Lihue, Island of Kauai, Hawaiian Islands, July 9, 1909 (Bish.).

Distribution: Known only from Hanopu near Lihue, Island of Kauai, Hawaiian Islands.

Specimens examined: *Forbes* 27*K* (type, Bish.: cotype, Field).

EXPLANATION OF PLATE XXXI

Bidens valida: a, flowering and fruiting specimen, ×0.54; *b*, a tripartite leaf, ×0.54; *c*, exterior involucral bract, ×3.23; *d*, interior involucral bract, ×3.23; *e*, palea, ×3.23; *f*, *g*, achenes, ×3.23; all from type.

49. **Bidens Stokesii** Sherff, Bot. Gaz. 70: 101, *pl. 12, figs. g–o.* 1920. Pl. XIX, figs. *g–o.*

Supra herbacea, infra verisimiliter fruticosa, glabra; caule subtetragono, ramoso, ± 6 dm. alto. Folia petiolata petiolis tenuibus 1.5–4 cm. longis, petiolo adjecto 4–9 cm. longa et 2.5–6 cm. lata, ternata vel 5 foliolis pinnata, membranacea, non ciliata, foliolis rhomboideo-ovatis vel lanceolatis, orbiculato-serratis, terminali interdum breviter acuminato raro inciso-lobulato. Capitula pauca, paniculato-corymbosa, tenuiter pedunculata (ad fines ramorum 10–14 cm. longorum nudorum) pedunculis 1–5.5 cm. longis, ligulata, pansa ad anthesin circ. 2–2.5 cm. lata et 7 mm. alta. Involucri bracteae exteriores circ. 8, lineares, glabratae vel sparsissime hispidae, apice induratae, 3–4 mm. longae, erectae vel recurvatae, interioribus longiores. Flores ligulati 6–7, flavidi, ligula oblongi, apice obscure denticulati, 7–10 mm. longi. Achaenia linearia, nigra, glabra, interdum plano-marginata sed non vere alata, saepe biaristata aristis tenuibus et obscure retrorso-hamosis, corpore ± 7 mm. longa.

Type specimen: Collected by *John F. G. Stokes*, at foot of plateau, southeast, Island of Niihau, Hawaiian Islands, January, 1912 (Bish.).

Distribution: Known only from Island of Niihau, Hawaiian Islands.

Specimens examined: *Stokes*, at foot of plateau, etc. (type, Bish.).

EXPLANATION OF PLATE XIX, FIGS. *g–o*

Bidens Stokesii: g, flowering branch, ×0.54; *h*, *i*, additional leaves, ×0.54; *j*, exterior involucral bract, ×5.39; *k*, interior involucral bract, ×5.39; *l*, ray corolla, ×5.39; *m*, palea, ×5.39; *n*, disc floret, ×5.39; *o*, achene, ×5.39; all from type.

50. **Bidens amplectens** Sherff, Bot. Gaz. 70: 99. 1920. Pl. XXXII.

Herbacea supra, infra verisimiliter suffruticosa, ramosa, caule ramisque tetragona, glabra, probabiliter 5–8 dm. alta. Folia plerumque pinnata, membranacea, petiolata petiolis tenuibus 2–4 cm. longis, petiolo adjecto 4–12.5 cm. longa et 3–7.5 cm. lata; foliolis 3–5, ovato-lanceolatis, serratis (saepe irregulariter et grosse dentatis) dentibus orbiculatis, ad apicem acuminatis, terminali saepe majore. Capitula non multa, subsolitaria in pedunculis, laxissime corymbosa, adolescentia iis *Cosmidis* specierum non dissimilia, florescentia 6–8 mm. alta et 3–5.5 cm. lata. Involucri bracteae exteriores 5–6,

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patentes vel etiam valde reflexae, crassiusculae, lineari-oblanceolatae, ad apicem subacutae et glanduloso-apiculatae, 3–6 mm. longae, quam interiores paulo breviores. Flores ligulati 7–8, ligula anguste obovati, apice obscure dentulati, 1.5–2.3 (rarius usque ad 4) cm. longi. Achaenia submatura grisea vel subnigra, plana, exalata, recta vel subrecta, marginibus apiceque setulosa, exaristata vel breviter biaristata aristis dense (hamis subrectis, albidis, elongatis) hamosis, corpore circ. 8–10 mm. longa.

Type specimen: Collected by *Charles Noyes Forbes* (with *Henry A. Pilsbry* and *C. Montague Cooke*), No. 1839*O*, at Kawaihapai, Waianae Range, Island of Oahu, Hawaiian Islands (Bish.).

Distribution: Known only from type locality on Island of Oahu, Hawaiian Islands.

Specimens examined: *William Bush & D. LeRoy Topping* 3684, rocky hillside, gulch between Kaena Point and Kawaihapai, October 12, 1933 (Field); *iidem* 3744 et 3745, eodem loco, May 6, 1934 (Field); *Otto Degener* 2099, arid *Lantana* region in ravine, Kawaihapai, December, 1925 (Field, 2 sheets); *idem* 3531, dry slope at edge of Forest Reserve (in valley east of the one in which No. 2099 was found), southeast of Kawaihapai Railroad Station, January 27, 1929 (Berl.; Boiss.; Brit.; Field; Kew; N.Y.); *idem & William Bush* 3532, alt. 300 meters, on spring-fed cliffs, opposite Kawaihapai Railroad Station, eodem tempore (Berl.; Boiss.; Brit.; Field; Kew; N.Y.); *iidem & K. K. Park* 4099, among bushes, grass, and rocks, in dry region, near upper part of trail in Keawaula Valley leading to Kuaokala Forest Reserve, November 28, 1931 (Berl.; Boiss.; Brit.; Calif.; Del.; Field, 2 sheets; Gray; Kew; Mo.; Mun.; Mus. V.; N.Y.; Par.; U.S.; U.V.); *Otto Degener & D. LeRoy Topping* 4121, on *Lantana*-covered, somewhat dry slope, along trail leading to top of Keawaula Valley, March 24, 1932 (Berl.; Brit.; Field; Gray; Kew); *C. N. Forbes* (with *H. A. Pilsbry* and *C. M. Cooke*) 1839*O* (type, Bish.: cotype, Field); *E. P. Hume* 305, alt. 180 meters, dry, wind-swept fore hill, Nihoa Gulch, mountain side, Mokuleia, November 15, 1932 (Bish.; Field); *Northwood & Topping* 3767, rocky hillside, new C.C.C. Trail, Kawaihapai, January 1, 1935 (Field).

B. amplectens × B. waianensis.—*B. waianensi* achaeniis supra medium valde recurvatis vel subtortis similis, aliter *B. amplectenti* plus minusve similis.

Specimens examined: *Degener & Topping* 4120, on *Lantana*-covered, somewhat dry slope, along trail leading to top of Keawaula

Valley, Oahu, Hawaiian Isls., March 24, 1932 (Berl.; Brit.; Field; Gray; Kew; Mo.).

Recently Mr. Otto Degener forwarded some specimens collected by himself and Mr. D. LeRoy Topping along the trail leading to the top of Keawaula Valley, on the Island of Oahu. One set, numbered by Degener 4119, was *B. waianensis* (q.v.). Another set, numbered by Degener 4121, was *B. amplectens* (v. supra). A third set, numbered by Degener 4120, was found to be of hybrid material, embodying throughout very emphatically the general habit of *B. amplectens* but approaching *B. waianensis* in the curvature or even the twisting of the distal half of the achenes.

B. amplectens × B. torta.—Vide sub *B. torta.*

EXPLANATION OF PLATE XXXII

Bidens amplectens: a, flowering and fruiting specimen, ×0.57; *b,* exterior involucral bract, ×3.44; *c,* interior involucral bract, ×3.44; *d,* ray corolla, ×2.87; *e,* palea, ×3.44; *f,* disc floret, ×3.44; *g,* achene, ×3.44; all from type.

51. **Bidens waimeana** Sherff, Bot. Gaz. 76: 164. 1923.
Pl. XXIII, figs. *i–o.*

Herba fruticosa, gracilis, erecta, ramosa, glabra, verisimiliter 4–8 dm. alta. Folia petiolata petiolis 1–4 cm. longis, petiolo adjecto 6–9 cm. longa, pinnatim 3–5-partita, foliolis membranaceis, ovato-lanceolatis, acuminatis, serratis. Capitula cymoso-corymbosa vel irregulariter dispersa, radiata, pansa ad anthesin circ. 1.5 cm. lata et 5–6 mm. alta. Involucri bracteae exteriores circ. 5, patentes, lineares, acutae vel obtusae, glabratae vel leviter glanduloso-hispidae, interioribus lanceolatis saepe aequales. Flores ligulati circ. 5, flavi, ligula elliptico-oblanceolati, apice obsolete denticulati, 6–8 mm. longi. Achaenia atra, linearia, obcompressa, utrinque moderate attenuata, recta vel leviter curvata, non manifeste striata, faciebus rugulosa sed non pubescentia, marginibus suberecto-setosa, corpore 6–8 mm. longa et 0.5–0.75 mm. lata, apice erecto-setosa, saepe ad apicem vel interdum parce sub apice brevissime biaristata aristis glabris vel rariter 1–2 hamis retrorsum hamosis.

Type specimen: Collected by *Amos Arthur Heller,* No. 2848, on Kaholuamanoa, above Waimea, Island of Kauai, Hawaiian Islands, October 1–8, 1895 (Mo.).

Distribution: Known only from type locality on Kaholuamanoa, above Waimea, Island of Kauai, Hawaiian Islands.

BIDENS FULVESCENS Sherff

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Specimens examined: *Heller*, on Kaholuamanoa, above Waimea, October 11–16, 1895 (Field); *idem* 2848 (type, Mo.: cotypes, Brit.; Calif.; Field; Gray; Kew; N.Y.; Petrop.; U.S.).

A species related to *Bidens asymmetrica* (Lévl.) Sherff, *B. micrantha* Gaud., and *B. micranthoides* Sherff. It can be told from *B. asymmetrica* by its straight or slightly curved, not twisted achenes; from *B. micrantha* by its marginally setose, smaller, more slender, and not conspicuously black achenes; from *B. micranthoides* by its taller, more branching, less herbaceous habit. The type specimen has the primary leaves mainly 5-partite; the cotypes examined have many of the primary leaves 3-partite.

EXPLANATION OF PLATE XXIII, FIGS. *i–o*

Bidens waimeana: i, flowering and fruiting branch, ×0.6; *j*, exterior involucral bract, ×3.6; *k*, interior involucral bract, ×3.6; *l*, ray corolla, ×3.6; *m*, palea, ×3.6; *n*, disc floret, ×3.6; *o*, achene, ×3.6; all from cotype in Hb. N.Y.

52. **Bidens micrantha** Gaud. Voy. Freycinet Bot. *pl. 85* (sine descript.). 1826; ibid. 464. 1830. Pl. X, figs. *a–h*.

Campylotheca micrantha (Gaud.) Cass. Dict. Sci. Nat. 51: 475. 1827.

Coreopsis micrantha (Gaud.) A. Gray, Proc. Amer. Acad. 5: 127. 1861.

Bidens sandvicensis var. *heterophylla* Gray (excl. syn. *B. luxurians* Hook. & Arn.), op. cit. 128.

Bidens Remyi Drake del Cast. Illustr. Fl. Ins. Mar. Pacif. *pl. 39*. 1888; non *B. Remyi* (Hillebr.) Sherff.

Coreopsis Remyi Drake del Cast. op. cit. 210. 1890.

a. Achaenia plerumque multum irregulariterque curvata; planta ex insula Oahu.....var. *γ. kaalana*.

a. Achaenia recta vel paulum curvata.

b. Foliorum principalium lamina vel foliolum terminale serratum 20–28 dentibus pro unico latere.....var. *δ. caduca*.

b. Dentes pauciores.

c. Folia 3–5-foliolata, foliolis anguste lanceolatis, acuminatis, quoque latere paucis dentulis ad medium serrato. *B. micrantha* sensu stricto.

c. Foliola latiora, magis profunde serrata, ad medium etiam laciniata.....var. *β. laciniata*.

Frutex glaber, caule plus minusve rubidus, 6–9 dm. altus. Folia gracilia, crassiuscula, irregulariter 3–5-foliolata vel summa simplicia, petiolata petiolis 1.5–5 cm. longis, petiolo adjecto 4–13 cm. longa,

foliolis anguste lanceolatis, acuminatis, quoque latere paucis dentulis ad medium serratis, 2–5 cm. longis et 4–12 mm. latis. Capitula numerosa, paniculata vel corymbosa, ligulata, pansa ad anthesin 4–6 mm. alta et 1.2–2 cm. lata, pedicellis tenerrimis 1–2.5 cm. longis. Involucri bracteae exteriores lineares, resino-pubescentes vel glabratae, minimae (circ. 1.5 mm. longae), bracteis interioribus multo minores. Flores ligulati 3–5, ligula anguste oblongi, flavi, saepe ad apicem obscure dentati, circ. 1 cm. longi. Achaenia linearia, nigra, obcompressa, recta vel torta, facie et marginibus plerumque glabra, corpore 7–10 mm. longa et circ. 0.8–1.5 mm. lata, apice nunc exaristata et setosa, nunc breviter biaristata vel etiam (marginibus excurrentibus sub apicem) irregulariter tri- vel quadriaristata, aristis glabris vel retrorsum hispidulis.

Type specimen: Collected by *Charles Gaudichaud* in the Hawaiian Islands.[1]

Distribution: Islands of Oahu, Lanai, Maui, and Hawaii, Hawaiian Islands.

Specimens examined: *Ballieu*, Hawaiian Isls. (Par.); *Adelbert Von Chamisso*, Oahu, 1817 (Berl., 2 sheets; Hll.; Kew; Petrop., 2 sheets; forma foliis indivisis); *C. N. Forbes* 14*H*, Puuwaawaa Mountain, Hawaii, June 8–14, 1911 (Bish.); *idem* 326*Mo*, ridge and foot of Lahainaluna Valley, Maui, February, 1913 (Bish.); *Gaudichaud* 71, Hawaiian Isls. (Del.); *idem*, sine num., Hawaiian Isls. (Par., 2 sheets); *William Hillebrand*, Hawaii (Brit.); *idem*, western and eastern Maui (Gray); *idem*, eastern Maui, 1870 (Kew); *idem* 43, Central Plateau, Hawaii (Berl., 2 sheets; Kew); *Menzies*, Hawaiian Isls. (Kew); *G. C. Munro* 122, Waiapaa, Lanai, September 26, 1913 (Bish., the form close to Gaudichaud's type illustration); *idem* 602, ridge to Puu Kukui, Maui (Bish.); *J. Remy* 281, Hawaii, 1851–1855 (Gray; cotype, *Coreopsis Remyi* Drake del Cast.); *J. F. Rock* 8200, alt. 1,200 meters, Kaanapali, western Maui, August 25, 1910 (Gray).

The identity of *Bidens micrantha* Gaud. has long been a matter of conjecture with most authors. Many appear to have assumed that Gaudichaud's original plate was only a crude representation, and that hence the delineation of foliage, etc., given there must not be interpreted very literally. Consequently, various other species have been referred arbitrarily to *B. micrantha* Gaud. to such an extent that references in literature to *B. micrantha* Gaud. are almost entirely

[1] Type herbarium not cited, but the Paris and Delessert herbaria contain specimens.

BIDENS CAMPYLOTHECA Schz. Bip.

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untrustworthy. In studying the recent collections from the Hawaiian Islands, I was impressed with the resemblance of a certain plant (*G. C. Munro* 602) to Gaudichaud's illustration. The leaves possessed the same peculiar outlines as in the drawing. A careful study of the plant showed that it was positively the true *B. micrantha*. Several other plants that, while varying in several minor details from this plant, were seen to belong nevertheless with it specifically, were then assembled. From this small group of specimens, together with some of Gaudichaud's own original specimens (Del.; Par.), I have been able to draw up the above description.

Gray's description of his *B. sandvicensis* var. *heterophylla* is seen to have been derived primarily from his specimen (Gray) of *Remy* 281. But that plant, as I have pointed out before (Bot. Gaz. 70: 97, footnote 9. 1920), is merely a form of *B. micrantha*. Contrary to my former understanding of the matter, however, the name *B. luxurians* Hook. & Arn. (nec alior.), although used by Gray synonymously, must be kept distinct from Gray's var. *heterophylla* and so from *B. micrantha*. The name *B. luxurians* Hook. & Arn. was based upon a plant (Kew) collected by Captain Beechey on the Island of Oahu and very different from *B. micrantha* Gaud.

Bidens micrantha var. *β.* **laciniata** (Hillebr.) Sherff, Bot. Gaz. 85: 8. 1928.

Campylotheca micrantha var. *laciniata* Hillebr. Fl. Haw. Isls. 216. 1888.

Foliola latiora, magis profunde serrata, ad medium etiam laciniata.

Type specimen: Found by *William Hillebrand* upon the Island of Maui, Hawaiian Islands.[1]

Distribution: Islands of Maui and Hawaii, Hawaiian Islands.

Specimens examined: *Faurie* 997, Wailuku, Maui, August, 1909 (Brit.); *C. N. Forbes & C. M. Cook, Jr.*, 24*M*, Maunahooma, western Maui, May, 1910 (Bish.; Field); *William Hillebrand*, south ridge of valley of Wailuku, Maui, August, 1870 (Brit.); *idem*, Kula, eastern Maui, 1871 (U.S.; sub nom. *Campylotheca micrantha β.*); *idem*, Haleakala Crater, Maui (Berl.); *idem*, Isl. Hawaii (Berl.); *idem & J. M. Lydgate*, Kula, Maui (Bish.); *J. M. Lydgate*, eodem loco (Berl.); *J. Remy* 280, Maui, 1851–1855 (Gray).

In his *Flora of the Hawaiian Islands*, Hillebrand listed two varieties under *Bidens micrantha* Gaud. (*Campylotheca micrantha*

[1] Hillebrand's first cited locality, Honuaula, appears unrepresented by material in herbaria. For specimens from his second and third localities, viz., Kula and Wailuku respectively, see text.

Cass.). One of these was his var. *laciniata*, and for its habitat the islands of Maui (Honuaula, Kula, Wailuku) and Hawaii were cited. Fortunately, there still exists in the herbarium of the Bernice Pauahi Bishop Museum a specimen collected by Hillebrand and Lydgate at Kula, Maui, and determined on the original label as "β. var. *laciniata* Hbd." Still another original specimen is in the British Museum of Natural History. It was collected by Hillebrand alone, at Wailuku, and was labeled "*Campylotheca micrantha* β. var." Additional specimens are those by Lydgate, from Kula, and by Hillebrand, from Haleakala Crater on Maui (both in Hillebrand's private herbarium, Berl.). These plants came from Hillebrand's cited localities and may be regarded as authentic for the var. *laciniata*. The plant collected by Hillebrand on Hawaii has the leaves somewhat more deeply incised.

Bidens micrantha var. γ. **kaalana** Sherff, Bot. Gaz. 85: 8. 1928. *Campylotheca micrantha* var. γ. Hillebr. Fl. Haw. Isls. 216. 1888.

Rami acriter tetragoni praecipue si herbacei. Foliola plerumque 3, ad apicem basimque minus elongata, dentibus 8–22 pro unico latere nunc perspicuis acribus apice saepe inflexis nunc minoribus. Capitula minora et ligulae breviores. Achaenia multum irregulariterque curvata, plerumque exaristata sed corona setulosa coronata.

Type specimen: Found on the Island of Oahu, Hawaiian Islands (see text).

Distribution: Western Oahu, Hawaiian Islands.

Specimens examined: *C. N. Forbes*, Makaha Valley, Kaala Range, February 12–19, 1909 (Field); *Francis R. Fosberg* 9482, erect, suffrutescent herb, 1 meter tall, alt. 640 meters, Halona Valley, Waianae Mts., District Lualualei, May 12, 1933 (Field); *idem* 9515, suffrutescent herb, 0.5 meter tall, alt. 640 meters, dry ridge, Pohakea Pass, Honouliuli, eodem tempore (Field); *William Hillebrand*, Waianae Range (Berl., type).

Hillebrand cited "Oahu! Kaala, and Waianae range" for his var. γ. In the apparent absence from herbaria of authentic original specimens, it had seemed unwise to attempt taking up this variety and giving it a formal name. Some years ago, however, the now deceased Charles N. Forbes sent me a large collection of Hawaiian specimens of *Bidens* which he had collected (cf. Bot. Gaz. 70: 98. 1920), and among these was one (Makaha Valley, Kaala Range, etc.; now in Hb. Field) from the type locality cited by Hillebrand. This matches Hillebrand's description very closely, and is so different

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from typical *B. micrantha* that it may well be interpreted as representing a valid variety. More recently (1933), I have been lent the entire Hillebrand collection of *Bidens* from Berlin. It contains two sheets labeled *Campylotheca micrantha* Cass. var. γ. One bears a specimen from Makaleha, Oahu. This is true *Bidens sandvicensis* Less. and must be discarded. The other bears two specimens from Waianae Range, Oahu. These fit the type description closely and are seen to match the Forbes plant from Makaha Valley.

The recently collected *Fosberg* 9482 is noteworthy in having larger and more conspicuously serrate leaflets, their teeth often up to 18–22 on a single edge and frequently somewhat inflexed at the tip. (Its general appearance comes close to that of the plate given by Drake del Castillo [Ill. Fl. Ins. Mar. Pacif. *pl. 38.* 1886] for *Bidens micrantha* Gaud. *Remy* 280 and 282, which Drake had for *B. micrantha*, and which I have not seen, were said by him to have come from Lanai and Maui. Later, however, he gave [p. 210] Hawaii for the habitat.) *Fosberg* 9488 (suffrutescent herb 0.7 meter tall, in dry forest, alt. 580 meters, Halona Valley, District of Lualualei, Oahu, May 12, 1933; Field) appears to be a hybrid between var. *kaalana* and *B. fulvescens*. So also does *Harold St. John* 13123 (common, 2–4 ft. tall, on open slopes, alt. 615 meters, Pohakea Pass, Halona, Lualualei Forest Reserve, Oahu, May 12, 1933; Bish. and Field).

Bidens micrantha var. δ. **caduca** Sherff, Amer. Journ. Bot. 22: 705. 1935.

Campylotheca sandvicensis var. β. Hillebr. Fl. Haw. Isls. 214. 1888.
Bidens sandvicensis var. *caduca* Sherff, Bot. Gaz. 85: 7. 1928.

Folia superiora simplicia vel tripartita, laminis vel segmentis magis elongatis oblongo-lanceolatis, dentibus (20–28 pro unico latere folii simplicis vel folii tripartiti folioli terminalis) minus protractis. Capitula minora (pansa ad anthesin tantum circ. 7–8 mm. lata) et multo plura, inflorescentia corymbiformi sed vix exserta. Achaenia matura atra circ. 1 cm. longa, aristis filiformibus vix hamosis et mox caducis.

Type specimen: Collected by *William Hillebrand* on the Island of Molokai, Hawaiian Islands (Berl.).

Distribution: Island of Molokai.

Specimens examined: *Hillebrand*, Molokai (type, Berl.).

EXPLANATION OF PLATE X, FIGS. *a–h*

Bidens micrantha: a, flowering and fruiting branch, ×0.59; *b*, exterior involucral bract, ×5.88; *c*, interior involucral bract, ×5.88;

d, ray corolla, ×3.53; *e*, palea, ×3.53; *f*, disc floret, ×5.88; *g*, *h*, achenes, ×3.53; all from *Munro* 122, in Hb. Bish.

53. **Bidens Menziesii** (Gray) Sherff, Bot. Gaz. 70: 98. 1920. Pl. XXXIII, figs. *o*, *q–v*.

Coreopsis (*Campylotheca*) *Menziesii* Gray, Proc. Amer. Acad. 5: 127. 1861.

Coreopsis Menziezii Gray ex Drake del Cast. Illustr. Fl. Ins. Mar. Pacif. 209. 1890.

Foliorum segmenta longe angusteque linearia, integerrima. *B. Menziesii* sensu stricto.

Foliorum segmenta saepe etiam usque ad 1.8 cm. lata, perspicue dentata..... var. β. *leptodonta*.

Foliorum segmenta angustissima et plerumque filiformia. var. γ. *filiformis*.

Suffruticosa, plerumque glabrata, 6–14 dm. alta, caule interdum 5 cm. crasso. Folia petiolata petiolis tenuibus 3–6 dm. longis, petiolo adjecto 6–15 cm. longa, bipinnata- (vel subternati-) secta, summa 3–5-partita; segmentis longe angusteque linearibus, circ. 2–5 mm. latis, membranaceis, integerrimis, acriter apiculatis, margine minute plus minusve revolutis. Capitula plurima in corymbum digesta, tenuiter breviterque pedicellata, radiata, pansa ad anthesin 1–2 cm. lata et 3–4.5 mm. alta. Involucri plerumque glabrati bracteae exteriores circ. 5, tantum circ. 1 mm. longae, lineares vel lineari-spathulatae, apice subobtusae; interiores lanceolatae, circ. 2.5–3.5 mm. longae. Flores ligulati 4 vel 5, flavi, ligula oblanceolati, apice subintegri, 6–9 mm. longi. Achaenia obcompressa, linearia, demum leviter flexuosa vel aegre torta, glaberrima, subnigra, unica facie circ. 4 primariis sulcis sulcata, apice calva rariusve obsolete 1 vel 2 setis munita, 8–13 mm. longa et 0.6–1.1 mm. lata, exteriora saepe tenuiter subalata.

Type specimen: Collected by the *United States Southern Pacific Exploring Expedition* under *Captain Wilkes*, upon the Island of Hawaii, Hawaiian Islands, 1840.[1]

Distribution: Islands of Molokai, Maui, and Hawaii, Hawaiian Islands.

[1] Gray mentioned no type, but the above specimen from Hawaii was the first cited. Gray cited also the Island of Maui for further U. S. S. Pacif. Expl. Exped. material, and definitely cited Menzies and Remy as additional collectors of the species. The Menzies and Remy plants are at Gray Herbarium, but my manuscript contains no mention of my having seen the type specimen there. The Wilkes specimen seen (U.S.) is the one from western Maui.

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Specimens examined: *F. D. Bennett*, Maui (Berl.); *Faurie* 998, Kamalo, Molokai, June, 1910 (Brit.); *idem* 999, alt. 1,000 meters, Kamalo, Molokai, June, 1910 (Brit.); *Degener & Wiebke* 2894 pro parte, dry, sunny slopes, alt. about 450 meters, small valley east of East Fork of Kawela Gulch, Molokai, June 11, 1928 (Berl.; Brit.; Field, 2 sheets; Kew; N.Y.); *iidem* 3006, arid, barren ledges, on cliffs, east slope of Kapulei, Molokai, June 25, 1928 (Berl.; Boiss.; Brit.; Field, 2 sheets; Kew; N.Y.); *iidem* 3007, hot, arid cliffs, second eastern gulch, Wawaia, Molokai, June 27, 1928 (Field, 2 sheets; N.Y.); *iidem* 3008, hot, barren cliffs, Kamalo Gulch, Molokai, June 29, 1928 (Field, 2 sheets; N.Y.); *C. N. Forbes*, ridge east of Wainu, western Maui, August, 1910 (Bish.; Field); *idem* 116*Mo*, mountains below Puu Kolekole, Molokai, July, 1912 (Bish.); *idem* 241*H*, Kanehaha, Kona District, Hawaii, June 23, 1911 (Bish.); *idem* 590*Mo*, Molokai, September, 1912 (Bish.); *William Hillebrand*, gulch of Kalae, Molokai, June, 1870 (Berl., 2 sheets; Brit.); *idem*, Molokai, 1870 (Kew); *idem*, Central Plateau of Hawaii (Berl.); *A. Menzies*, Hawaiian Isls. (Kew, 2 sheets; Brit.); *U. S. Expl. Exped.* under *Capt. Wilkes*, western Maui (U.S.); *Henry Wiebke* 3083, arid cliffs, East Ohia, Molokai, July 17, 1928 (Berl.; Brit.; Field; Kew; N.Y.).

Bidens Menziesii var. β. **leptodonta** Sherff, Bot. Gaz. 85: 9. 1928.

Campylotheca (*Coreopsis*) *Menziesii* var. β. Hillebr. Fl. Haw. Isls. 216. 1888.

Foliorum segmenta primaria saepe etiam usque ad 1.8 cm. lata, interdum usque ad costam mediam secta, dentibus plerumque perspicue elongatis et tenuibus.

Type specimen: Collected by *William Hillebrand* on the Island of Maui, Hawaiian Isls.[1]

Distribution: Islands of Hawaii and Maui, Hawaiian Islands.

Specimens examined: *C. N. Forbes* 162*H*, slopes of Hualalai, Hawaii, June 15, 1911 (Bish.); *Hillebrand* 29, Kohala, Hawaii (Kew); *idem* 298, Hawaii (Kew); *idem*, Maui (sub nom. *Campylotheca Menziesii* β. var., Brit.); *J. F. Rock* 8310, alt. 1,800 meters, Kemole, Mauna Kea, Hawaii (Gray).

Hillebrand's var. β., my var. *leptodonta*, was cited for eastern Maui and also the Island of Hawaii. His description is faulty,

[1] Hillebrand was not in the habit of designating his types as such, but the authentic specimen in the British Museum of Natural History, labeled by him *Campylotheca Menziesii* β. var., appears to be the only one of its collection left by Hillebrand and hence may well be regarded as a type.

giving the leaves as 2 inches long, the primary segments cut to the rachis. The leaves on some of his own material are over 5 inches long; only comparatively few of the primary segments are cut to the rachis, but usually enough are thus deeply cut to impart a distinctive appearance to the foliage.

Bidens Menziesii var. γ. **filiformis** Sherff, Bot. Gaz. 85: 9. 1928. Pl. XXXIII, fig. *p*.

Campylotheca (*Coreopsis*) *Menziesii* var. γ. Hillebr. Fl. Haw. Isls. 216. 1888.

Foliorum segmenta secundaria angustissima et plerumque filiformia.

Type specimen: Collected by *William Hillebrand* on the Central Plateau of the Island of Hawaii, Hawaiian Islands (Berl.).

Distribution: Islands of Hawaii and Molokai, Hawaiian Islands.

Specimens examined: *Degener & Wiebke* 2894 pro parte, with the species, dry sunny slopes, alt. about 450 meters, small valley east of East Fork of Kawela Gulch, Molokai, June 11, 1928 (Berl.; Boiss.; Brit.; Field, 2 sheets; Kew; Mun.; N.Y.); *C. N. Forbes* 877*H*, Koehe, Hawaii, June 17, 1915 (Bish.; Field); *Hillebrand*, Central Plateau, Hawaii (type, Berl.); *idem* 30, eodem loco (Kew); *idem & J. M. Lydgate*, cum specie commixt., Hawaiian Isls. (Bish.); *H. Mann & W. T. Brigham*, Central Plateau, Hawaii (Bish.); *iidem* 520, alt. 1,800 meters, Hualalai, Hawaii (Bish.; Del.; Gray; Kew; Mo.; U.S.); *iidem* 589, Hawaiian Isls. (Bish.); *J. Remy* 290, Hawaii, 1851–1855 (Gray); *J. F. Rock* 8351, Nohonaohae Crater, Hawaii, June, 1910 (Gray).

EXPLANATION OF PLATE XXXIII, FIGS. *o–v*

Bidens Menziesii (figs. *o*, *q–v*): *o*, cauline leaf, ×0.58; *q*, exterior involucral bract, ×5.78; *r*, interior involucral bract, ×5.78; *s*, ray corolla, ×3.47; *t*, palea, ×5.78; *u*, disc floret, ×5.78; *v*, achene, ×3.47; all from *Wiebke* 3083 in Hb. Field.

Bidens Menziesii var. *filiformis* (fig. *p*): small portion of branch with two subtended leaves, ×5.78; from *Forbes* 877*H* in Hb. Field.

54. **Bidens waianensis** Sherff, Bot. Gaz. 70: 104. 1920. Pl. XIV, figs. *h–p*.

Campylotheca micrantha var. *laciniata* f. *dissecta* Skbg. Act. Hort. Gothoburg. 2: 273. 1925.

Frutex glaber, supra ramosus, verisimiliter 5–8 dm. altus. Folia gracilia, petiolata petiolis tenuissimis 1.5–4 cm. longis, petiolo

adjecto 4–12 cm. longa et 3–6 cm. lata, plerumque pinnata vel plus minusve bipinnata, foliolis primariis lanceolatis serratis acuminatis vel iterum pinnatis lobis ultimis linearibus integris ad apicem acriter mucronatis. Capitula multa, corymbosa vel corymboso-paniculata, pansa ad anthesin circ. 6 mm. alta et 1.5–2 cm. lata, breviter supra folia exserta, floribus 15–25. Involucri bracteae exteriores circ. 6, lineares, glabratae vel sparsim glanduloso-pulverulentae, ad apicem subacutae, 1–2 mm. longae, quam bracteae interiores dimidio breviores. Flores ligulati circ. 5, flavidi, ligula oblongo-oblanceolati, ad apicem obtusi, circ. 1 cm. longi. Achaenia linearia, subtetragono-obcompressa, nigra, valde torta, glabra vel apicem versus remote setosa, exalata, matura exaristata et 6–10 mm. longa.

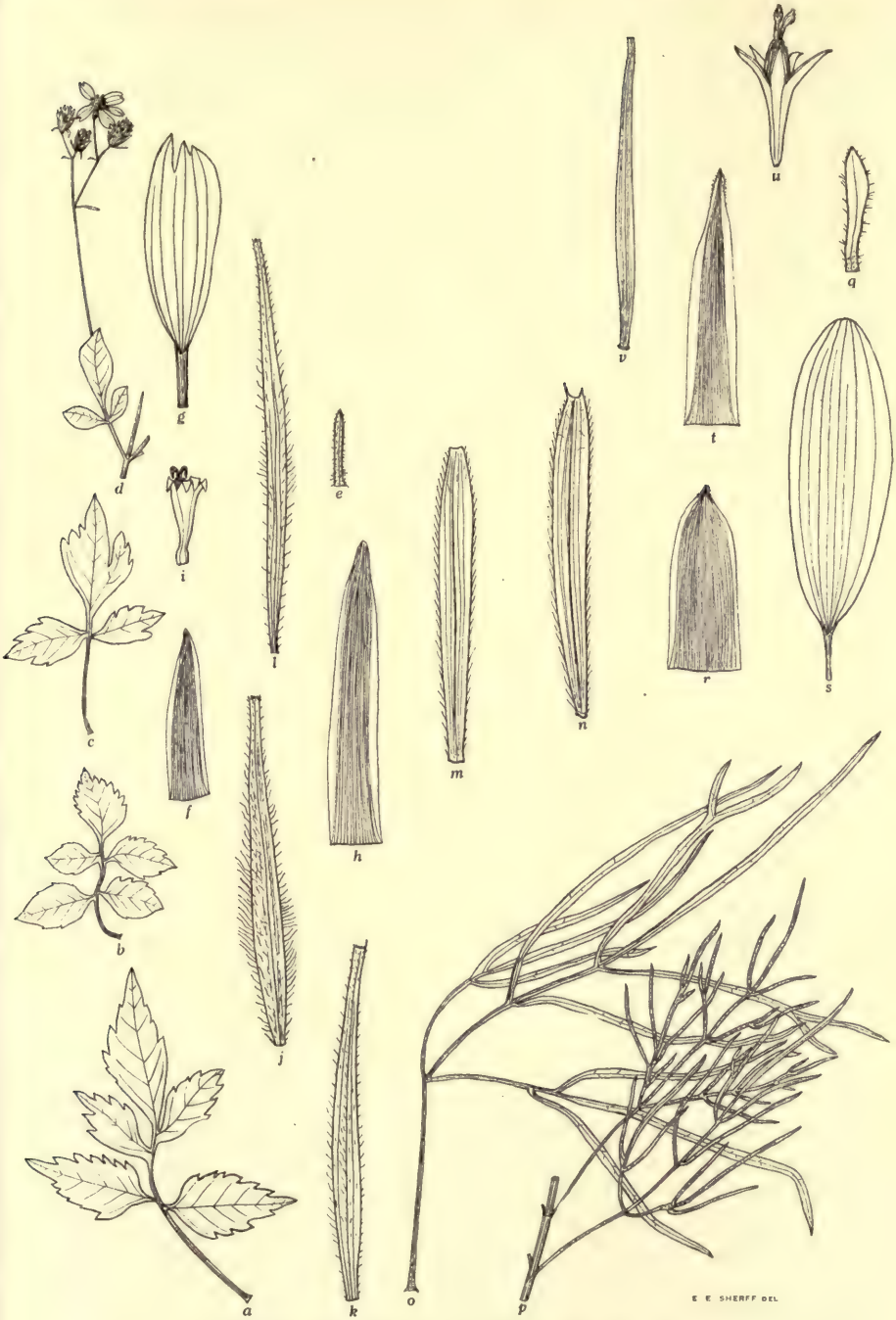
Type specimen: Collected by *Charles N. Forbes*, No. 2023*O*, at Kolekole Pass, Waianae Range, Island of Oahu, Hawaiian Islands, February 1 and 2, 1915 (Field).

Distribution: Island of Oahu, Hawaiian Islands.

Specimens examined: *Otto Degener* 3535, dry slope at edge of Forest Reserve, valley southeast of Kawaihapai Railroad Station, January 27, 1929 (Berl.; Boiss.; Brit.; Field; Kew; N.Y.); *idem & Kwan Kee Park* 4078, sunny, moderately dry ridge near Puumanawahua, Waianae Ridge, September 27, 1931 (Berl.; Field; Gray; Mo.); *iidem & Y. Nitta* 4115, windy, grassy, moderately dry plain, Kolekole Pass, Waianae Range, March 13, 1932 (Berl.; Brit.; Field; Gray; Kew); *iidem* 4135, growing about 3 ft. high, comparatively weed-covered and grassy plateau near pipe line, one-half mile southwest of exact middle of summit ridge between Kaala and Kalena, April 24, 1932 (Berl.; Brit.; Field; Gray; Kew); *iidem* 4136, commonly 5 ft. high, open forest ridge where rain is frequent, one-fourth mile northeast of plants under No. 4135, same date (Berl.; Field; Gray; Kew; N.Y.); *iidem* 4252, in dry, grassy, wind-swept region, Kolekole Pass, March 13, 1932 (Berl.; Brit.; Del.; Field; Goth.; Gray; Kew; Mo.; Mun.; N.Y.; Par.; U.S.); *iidem* 4253, below Puu Kalena, same date (Berl.; Field; Goth.); *iidem & Wm. Bush* 4129, rocky, rather dry slope partly covered with *Lantana* and grasses, 500 ft. northwest of Puu Kailio (near Kolekole Pass), May 1, 1932 (Field; Gray); *iidem* 4130, eodem loco et tempore (Berl.; Brit.; Field; Gray; Mo.); *iidem* 4131, eodem loco et tempore (Berl.; Brit.; Field; Gray; Mo.); *Degener, Park, Potter, & Bush* 10046 pro parte, grassy, shrubby slope, west side of Makaleha Valley, July 21, 1935 (Field); *Otto Degener & D. L. Topping* 4119, *Lantana*-covered, somewhat dry slope, along trail leading to top of

Keawaula Valley, March 24, 1932 (Field; Gray; Kew); *iidem* 10539, in dry scrub, northeast side of Puu Kumakalii, April 1, 1936 (Field); *Degener & Henry Wiebke* 2321, wind-swept arid grassy slope, Kolekole Pass, January 1, 1928 (Berl.; Field, 3 sheets; Kew; Mun.); *iidem & Guberlet* 2294, wind-swept arid ridge, Kolekole Pass, December, 1925 (N.Y.); *C. N. Forbes* 2023*O* (type, Field: cotype, Bish.); *F. R. Fosberg* 10884, erect herb 1.5 meters tall, moist forest, alt. 780 meters, Puu Kawiwi–Puu Kaala ridge, Waianae Mts., March 31, 1935 (Field); *J. A. Harris*, Oahu, August 22, 1924 (Field); *A. S. Hitchcock* 13958, slope of hill, Schofield Barracks, pass at west end, July 6, 1916 (U.S.); *E. Y. Hosaka* 177, shrub 3 ft. tall, alt. 750 meters, on dry slope, Puu Hapapa, back of Schofield Barracks, Waianaeuka, March 16, 1930 (Field; N.Y.; forma foliis plerumque indivisis); E. P. Hume 276, alt. 240 meters, dry slope, Waianae Valley, Waianae Mts., November 5, 1931 (Bish.; Field); *Alfred Meebold* (*Degener* distrib. No.) 4165, alt. 540 meters, Puu Hapapa, June, 1932 (Field; Gray; Kew); *Kazuto Nitta* (*Degener* distrib. No.) 3879, alt. 510 meters, Mt. Kaala, October 13, 1929 (Field; forma foliis atypicis); *idem* (*Degener* distrib. No.) 3880, alt. 450 meters, Mt. Kaala, October 13, 1929 (Field; forma); *Carl Skottsberg* 924, Waianae, October 24, 1922 (Goth.); *idem* 1135, Makaha Valley, October 24, 1922 (Field; cotype, *Campylotheca micrantha* var. *laciniata* f. *dissecta* Skbg.); *J. F. G. Stokes*, Kolekole Pass, 1915 (Bish.); *D. L. Topping* 3405, dry hillsides, along firebreak trail on northeast slope between Mt. Kumakalii and Mt. Kalena, January 6, 1929 (Berl.; Field; N.Y.); *idem* 3406, eodem loco et tempore (Berl.; Field; N.Y.; forma foliis nunc simplicibus nunc tripartitis sed achaeniis maturis typica); *idem* 3407, eodem loco et tempore (Berl.; Brit.; Field; Kew; N.Y.); *idem* 3408*a*, eodem loco et tempore (Brit.; Field; N.Y.); *idem* 3408*b*, eodem loco et tempore (Field); *U. S. Expl. Exped.* under *Capt. Wilkes*, sine loco (U.S.); *eadem*, Oahu (Gray; N.Y.); *eadem*, Kaala Mts., Waianae Range, 1838–1842 (N.Y.).

Asa Gray had determined the specimens collected under Captain Wilkes as being *Bidens micrantha* Gaud. (*Coreopsis micrantha* Gray). Later, in discussing *Bidens micrantha* (Proc. Amer. Acad. 5: 127. 1861), he said: "Sandwich Islands, especially Oahu. Variable in the foliage, which is commonly more dissected than in Gaudichaud's figure." Clearly Gray had in mind the Wilkes plants, collected in the Waianae Range on Oahu. A study of the more recent specimens cited above, all collected in the same immediate locality, shows the same peculiarities of foliage. Furthermore, the floral and achenial



BIDENS SANDVICENSIS var. SETOSA Sherff (figs. *a–l*)
BIDENS BIPONTINA Sherff (figs. *m*, *n*)
BIDENS MENZIESII (Gray) Sherff (figs. *o*, *q–v*) and var. FILIFORMIS Sherff (fig. *p*)

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characters are seen to be very distinct from those of the more widely distributed *Bidens micrantha*, which occurs not only on Oahu but also on Hawaii, Maui, and Lanai.

Hybrids with *B. amplectens* (q.v.) are known.

EXPLANATION OF PLATE XIV, FIGS. *h–p*

Bidens waianensis: h, i, typical leaves, ×0.67; *j,* exterior involucral bract, ×6.67; *k,* interior involucral bract, ×6.67; *l,* ray corolla, ×4; *m,* palea, ×6.67; *n,* disc floret, ×6.67; *o, p,* achenes, ×4; *h, p,* from cotype in Hb. Bish.; rest from type.

55. **Bidens Hillebrandiana** (Dr. del Cast.) Deg. ex Sherff, Bot. Gaz. 85: 6. 1928. Pl. XXXIV.

Campylotheca Remyi Hillebr. Fl. Haw. Isls. 211 and 212. 1888.

Coreopsis Hillebrandiana Drake del Cast. Illustr. Fl. Ins. Mar. Pacif. 209. 1890.

Campylotheca Rutifolia Lévl. Repert. Sp. Nov. 10: 123. 1911.

Bidens Remyi (Hillebr.) Sherff, Bot. Gaz. 70: 97. 1920; non *B. Remyi* Drake del Cast. op. cit. 78, *pl. 39.* 1888; nec Drake del Cast. ibid. 210. 1890.

Omnino herbacea, late patens; ramis glabris, angulatis, 2–5 dm. longis, nonnullis decumbentibus et nodis radicantibus vel adscendentibus. Folia tenuiter petiolata petiolis 1–5 cm. longis, petiolo adjecto usque ad 12 cm. longa, nunc (rarissime) indivisa et ovata, nunc pinnatim 3–5-partita, nunc bipinnata foliolis lateralibus longe (usque ad 1 cm.) tenuiterque petiolulatis, segmentis obovatis vel oblongis, obtusis, crenatis, saepe decurrentibus, membranaceis vel crassiusculis, margine dentibusque eciliatis sed plus minusve induratis, plerumque revolutis, glabris vel interdum adpresso-hispidis. Capitula pauca vel subnumerosa, tenuiter pedunculata pedunculis (nunc simplicibus nunc plus minusve decompositis) usque ad 1 dm. longis, radiata, pansa ad anthesin 4–6 mm. alta et ± 1 cm. lata. Involucri bracteae glabratae, exteriores circ. 4, lineari-oblongae, supra dilatato-obtusae, 1–3 mm. longae; interiores ovato-lanceolatae, duplici ter longae. Flores ligulati circ. 5, flavi, ligula elliptico-oblongi, apice obtuso-rotundati et obscure denticulati, ± 5 mm. longi. Achaenia obcompressa, atra, lineari-oblonga, exalata, unica facie circ. 4-striata, margine erecto-ciliata, corpore usque ad circ. 8 mm. longa (paleas usque ad 1 cm. longas non aequantia) et circ. 1 mm. lata, biaristata aristis retrorsum hamosis 1–2.3 mm. longis.

Type specimen: Collected by *Jules Remy,* No. 287, on the Island of Hawaii, Hawaiian Islands, 1851–1855 (Gray).

Distribution: Islands of Molokai, Maui, and Hawaii, Hawaiian Islands.

Specimens examined: *Otto Degener & Henry Wiebke* 2097, exposed coast, Niulii, Kohala, Hawaii, August 6, 1926 (Field, 3 sheets; Haw., 2 sheets); *iidem* 2166, seacoast, Kohala, Hawaii, July 31, 1926 (Field); *Urbain Faurie* 931, Wailau, Molokai, June, 1910 (first cited number of *Campylotheca Rutifolia* Lévl.; Brit.; Par.); *idem* 965, Hawaiian Islands, 1909 (second cited number of *Campylotheca Rutifolia* Lévl.; Brit.); *C. N. Forbes* 268*M*, Hana, Maui, July, 1910 (Bish.; Field; Mo.); *idem* 524*Mo*, shore cliffs, Wailau Valley, Molokai, September, 1912 (Bish.); *F. R. Fosberg* 9666, alt. 8 meters, talus slopes at foot of cliffs, Wailau Valley, Molokai, July 4, 1933 (Field); *idem* 9916, alt. 5 meters, ocean bluffs, Pauwalu Point, near Keanae, Maui, August 20, 1933 (Field); *Kazuto Nitta* (for *Otto Degener*) *& Henry Wiebke* 3173*a*, on talus slope and cliffs exposed to ocean spray during storms, western side of Wailau Valley, Molokai, August 4, 1928 (Field); *iidem* 3173*b*, eodem loco, August 5, 1928 (Berl.; Boiss.; Brit.; Field, 2 sheets); *iidem* 3173*c*, eodem loco, August 11, 1928 (Berl.; Brit.; Field, 2 sheets; Kew); *iidem* 3173*d*, eodem loco, August 12, 1928 (Berl.; Boiss.; Brit.; Field, 3 sheets; Kew); *Jules Remy* 287 (type, Gray); *Anthony Apo Tam* (*Degener* distrib. No.) 4249, between Pawela and Huelo, eastern Maui, September, 1932 (Berl.; Brit.; Del.; Field; Goth.; Gray; Kew; Par.; nom. vulg., Aupana).

A species offering apparently only little difficulty in determination. The herbaceous, more or less prostrate branches, combined with the foliage habit, are very distinctive. The Forbes plants from Molokai and Maui have some of the principal leaves bipinnate. *Faurie* 965 has a few of the leaves simple and has been described by Léveillé under the name *Campylotheca Rutifolia*. It appears different in no important respect, however, from ordinary *B. Hillebrandiana*.

This species must not be confused with *Bidens Remyi* Drake del Cast., which was published at first (1888) with only a plate and analysis, the description following later (1890). Even though that name (based upon *J. Remy* 281) is referable to *B. micrantha* Gaud. (cf. Bot. Gaz. 70: 97, footnote 9. 1920), it nevertheless must be taken as having precluded the acceptance of my name *B. Remyi* (Hillebr.), made later. Mr. O. Degener suggested (in lit., February 21, 1927) the taking up, therefore, of the trivial name *Hillebrandiana* for the plant described first by Hillebrand under the name *Campylotheca Remyi*.[1]

[1] I am informed by Dr. John Hendley Barnhart, of the New York Botanical Garden (in lit., November 30, 1927), that Hillebrand's *Flora Hawaiiensis* was

BIDENS HILLEBRANDIANA (Dr. del Cast.) Deg. *ex* Sherff

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EXPLANATION OF PLATE XXXIV

Bidens Hillebrandiana: a, fruiting branch, ×0.56; *b*, an individual appressed-hispid leaf, ×0.56; *c*, exterior involucral bract, ×5.6; *d*, interior involucral bract, ×4.5; *e*, palea, ×2.8; *f*, achene, ×2.8; all from type.

56. **Bidens mauiensis** (Gray) Sherff, Bot. Gaz. 70: 98. 1920. Pl. XXXV, figs. *a* and *e*.

Coreopsis mauiensis Gray, Proc. Amer. Acad. 5: 125. 1861.

Campylotheca mauiensis (Gray) Hillebrand, Fl. Haw. Isls. 211 and 213. 1888.

Capitula pansa ad anthesin circ. 1.5–2.5 cm. lata.

Folia (rariter indivisa) plerumque trisecta vel etiam 3–5-partita segmentis oblongis vel subcuneatis. *B. mauiensis* sensu stricto.

Folia nunc indivisa nunc tripartita laminis segmentisve lanceolatis vel ovatis vel subrhomboideis vel etiam late cuneato-spathulatis. . . . . var. *β. cuneatoides.*

Folia nunc indivisa laminis ovato-orbiculatis basi latissime cuneatis vel etiam subtruncatis, nunc 3–5-partita segmentis saepius rhomboideo-ovatis et apice obtusis. . hybrida *B. mauiensis* var. *cuneatoides* × *B. Hillebrandiana.*

Capitula pansa ad anthesin saepius circ. 1.2–1.5 cm. lata.

Folia principalia saepius 5-partita parce bipinnatisecta. var. *δ. media.*

Folia plerumque indivisa rarius tripartita. . . . . var. *ε. Forbesiana.*

Folia valde 2–3-pinnatisecta. . . . . var. *γ. lanaiensis.*

Decumbens, inferne lignea, valde ramosa, sparsim pubescens, mox glabrata, ramis 1.5–4.5 dm. longis, dichotomis, in furcis senioribus pedunculos marcidos ferrentibus. Folia petiolata petiolis 1–2.5 cm. longis, petiolo adjecto usque ad circ. 5 cm. longa, rariter nonnulla indivisa et ovato-deltoidea, plerumque trisecta vel etiam 3–5-partita segmentis oblongis vel subcuneatis, obtusis acutisve, incisodentatis vel etiam pinnatipartitis, submembranaceis, margine plerumque eciliatis. Capitula longe pedunculata pedunculis nudis monocephalicis folia multo superantibus 7–18 cm. longis, radiata, pansa ad anthesin 1.5–2.5 cm. lata et 6–8 mm. alta. Involucri

mentioned in the Journal of Botany for April, 1888, and was published "probably in March" of that year. Dr. Barnhart finds Drake del Castillo's work (Ill. Fl. Ins. Mar. Pacif., fasc. 4) referred to later, Nat. Novit., 2nd number for June, 1888; he believes that Drake del Castillo's work (fasc. 4) was published "probably late in May" of the same year.

bracteae exteriores 6–8, oblongo-lineares vel lineari-spathulatae, interdum ciliatae, ad apicem saepe glandulo-apiculatae, 3–4.5 mm. longae, interioribus subaequales. Flores ligulati 7 vel 8, flavidi, ligula elliptico-oblongi vel oblongo-oblanceolati, apice 3-dentati, 7–9 mm. longi; flores disci circ. 10. Achaenia plana, glabra, brunneo-atra, oblonga, alata, recta vel parce curvata, corpore 6–8 mm. longa et alis exclusis 0.8–1.2 (alis inclusis 1.5–2.1) mm. lata, alis supra in dentes vel aristas obsoletas et interdum seta minuta horizontali instructas productis.

Type specimen: Collected by the *United States Southern Pacific Exploring Expedition* under *Captain Wilkes*, sandy or dry hills near the coast, Island of Maui, Hawaiian Islands, 1840 (Gray; see discussion under var. *cuneatoides*).

Distribution: Islands of Maui and Molokai, Hawaiian Islands.

Specimens examined: *Degener & Wiebke* 2678, extremely arid, almost bare hills, from Papawai Point toward Puu Anu through Manawainui Gulch, Maui, July 12, 1927 (Brit.; Field; N.Y.); *iidem* 2679, extremely dry, barren hills near McGregor, west Maui, July 10, 1927 (Berl.; Boiss.; Field; Kew); *William Hillebrand*, Molokai (Berl.); *idem*, road between Lahaina and Wailuku, western Maui (Berl.); *idem & J. M. Lydgate*, Isthmus of Maui (Bish.); *Jules Remy* 289, Maui, 1851–1855 (Gray); *U. S. S. Pacif. Expl. Exped.* under *Capt. Wilkes*, sandy or dry hills, etc. (type, Gray: cotypes, N.Y.; Par.).

For critical notes see under var. *cuneatoides*.

Bidens mauiensis var. *β.* **cuneatoides** Sherff, Bot. Gaz. 86: 440. 1928. Pl. XXXV, figs. *b–d*, *f–o*.

A specie foliis nunc indivisis nunc tripartitis laminis segmentisve lanceolatis vel ovatis vel subrhomboideis vel etiam late cuneato-spathulatis, habitu fere *Bidentis cuneatae* differt.

Type specimen: Collected by *Otto Degener* and *Henry Wiebke*, No. 2680, on barren aeolian deposits near Wailuku, Island of Maui, Hawaiian Islands, July 9, 1927 (Field).

Distribution: Known only from type locality on the Island of Maui, Hawaiian Islands.

Specimens examined: *Degener & Wiebke* 2261, arid, aeolian deposits, southeast of Wailuku, July 7, 1927 (Berl.; Boiss.; Field, 2 sheets; Kew; Mun.); *iidem* 2680 (type, Field: cotypes, Berl.; Boiss.; Brit.; Kew; N.Y.); *H. Mann & W. T. Brigham* 372, Isthmus of Maui (Bish.; Brit.; Corn.; Del.; Field, 2 sheets; Gray; Kew; Mo.; U.S., etc.).

BIDENS MAUIENSIS (Gray) Sherff (figs. *a*, *e*); var. CUNEATOIDES Sherff (figs. *b–d*, *f–o*)

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The type material of *Bidens mauiensis* (the species proper) had the leaves, except for one small branchlet apparently somewhat ignored by Asa Gray in writing his original description, rather well dissected, with segments mostly linear to oblong, rarely rhombic-ovate. The duplicate sheet in the Torrey Herbarium (N.Y.) has, at the right, one specimen with some leaves tripartite and some undivided, the blades or their segments more or less rhombic-ovate, and somewhat suggestive of those of *Bidens cuneata* Sherff. Doubtless had Gray seen this last specimen he would have presented a different or an additional treatment. In any case, we are fortunate in having at hand two new and excellent series of specimens collected in July, 1927, by Degener and Wiebke in the type region. Their Nos. 2678 and 2679 are of the species as described by Gray. Their Nos. 2261 and 2680 have the leaves simple or merely tripartite. These latter thus match the ignored or at least undescribed specimens collected with Gray's type of the species proper. They are matched in turn by *Mann & Brigham* 372. The specimens of *Mann & Brigham* 372 at the Delessert Herbarium, the Bishop Museum, and the United States National Herbarium have the leaves mostly simple, but elsewhere they are mainly tripartite.

The pronounced difference between the two types of foliage makes it appear worth while to treat the plants with simple or tripartite foliage as varietally distinct.

Bidens mauiensis var. **cuneatoides** × **B. Hillebrandiana**

Folia nunc indivisa laminis ovato-orbiculatis basi latissime cuneatis vel etiam subtruncatis, nunc 3–5-partita segmentis saepius rhomboideo-ovatis et apice obtusis. Capitula ad anthesin non valde radiata, disco circ. 1.2–1.4 cm. lato. Achaenia latiora alis inclusis principalia 3.2–3.8 mm. latis.

Distribution: Southwesternmost East Maui.

Specimens examined: *Anthony Apo Tam* (*Otto Degener* distrib. No.) 4329, near the beach at Kanaio, Island Maui, November 28, 1932 (Field; N.Y.; etc.).

Bidens mauiensis var. γ. **lanaiensis** Sherff, Bot. Gaz. 80: 381. 1925.

Campylotheca mauiensis var. β. (sine nom.) Hillebrand, Fl. Haw. Isls. 213. 1888.

Var. foliis magis membranaceis et magis divisis, petiolis tenuibus usque ad 5 cm. longis; capitulis minoribus, pansa ad anthesin circ. 1.2–1.5 cm. latis; bracteis exterioribus minoribus; floribus

ligulatis plerumque tantum 5 vel 6; achaeniis brevioribus 5–7 mm. longis, atris, plano-convexis vel etiam subtetragonis, nunc anguste alatis nunc exalatis, apice exaristatis sed minute coronulatis.

Type specimen: Collected by *William Hillebrand*, Island of Lanai, Hawaiian Islands, in 1870 (Gray).

Distribution: Islands of Lanai and Maui, Hawaiian Islands.

Specimens examined: *Hillebrand*, Lanai (Berl.); *idem*, eodem loco, July, 1870 (Brit.; Gray; Kew); *idem*, eodem loco, 1870 (type, Gray: cotype, Berl.); *idem*, northern Maui (Brit.).

The specimens from Lanai, as also the Hillebrand specimen from "northern Maui," are of the same general habit as the typical *B. mauiensis* from Maui (and Molokai), but in respect to the characters noted above are definitely marked. It will be observed that there are more pronounced differences than are found to occur in certain other cases between two accepted species (e.g., *Bidens connata* and *B. comosa*, *B. coronata* and *B. mitis*, *B. pilosa* and *B. biternata*). In the case at hand, however, the remarkable degree of endemism manifested by Hawaiian plants renders the value of these distinguishing characters somewhat uncertain. For the present, I have thought it best to follow mainly the treatment of Hillebrand and of Charles N. Forbes, both of whom regarded the Lanai material as representing a variety (or varieties) of *B. mauiensis*.

Bidens mauiensis var. δ. **media** Sherff, Bot. Gaz. 86: 441. 1928.

Ex characteribus pro maxima parte var. *lanaiensi* similis sed foliis principalibus saepius 5-partitis parce bipinnatisectis minus decomposita; ex var. *Forbesiana* foliis non plerumque indivisis differt.

Type specimen: Collected by *George C. Munro*, No. 450, Maunalei, Island of Lanai, Hawaiian Islands, April 19, 1915 (Field).

Distribution: Known only from type locality, Island of Lanai, Hawaiian Islands.

Specimens examined: *G. C. Munro* 450 (type, Field: cotype, Bish.).

See remarks under next following var. *Forbesiana*.

Bidens mauiensis var. ε. **Forbesiana** Sherff, Bot. Gaz. 86: 441. 1928.

Ex characteribus pro maxima parte var. *lanaiensi* similis sed foliis plerumque indivisis rarius tripartitis differt.

Type specimen: Collected by *George C. Munro*, No. 451, Maunalei, Island of Lanai, Hawaiian Islands, April 19, 1915 (Bish.).

BIDENS MOLOKAIENSIS (Hillebr.) Sherff

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Distribution: Known only from type locality, Island of Lanai, Hawaiian Islands.

Specimens examined: *G. C. Munro* 451 (type, Bish.).

This and the var. *media* were included in a former paper (Bot. Gaz. 80: 381. 1925) among the plants referred to *B. mauiensis* var. *lanaiensis*. The considerations already referred to, however, for the var. *cuneatoides* make it appear similarly preferable here to segregate from the var. *lanaiensis* the two types of foliage which *differ in not being finely dissected.*

The name *Forbesiana* alludes to Charles Noyes Forbes, who before his death (in 1920) had studied the type plant and regarded it as typifying a new variety.

EXPLANATION OF PLATE XXXV

Bidens mauiensis, figs. *a* and *e*: *a*, flowering branch, ×0.67; *e*, leaf from plant shown in *a*, drawn to show characteristic appearance of leaves when dry and folded, ×0.67; from one of several specimens on type sheet in Hb. Gray.

Bidens mauiensis var. *cuneatoides*, figs. *b–d*, *f–o*: *b*, entire flowering plant, ×0.67; *c*, *d*, tripartite leaves, ×0.67; *f*, exterior involucral bract, ×3.35; *g*, interior involucral bract, ×3.35; *h*, ray corolla, ×3.35; *i*, palea, ×3.35; *j*, disc floret, ×3.35; *k*, anthers, ×23.5; *l*, upper portion of pistil, ×23.5; *m*, peripheral ovary, ×13.4; *n*, *o*, achenes, ×3.35; *b*, *c*, *m–o*, from material in blue envelope on type sheet of species proper, in Hb. Gray; *d*, from sheet bearing cotype of species proper in Hb. N.Y.; *f–l*, from *Mann & Brigham* 372, in Hb. Mo.

57. **Bidens molokaiensis** (Hillebr.) Sherff, Bot. Gaz. 70: 97. 1920. Pl. XXXVI.

Campylotheca molokaiensis Hillebr. Fl. Haw. Isls. 211, 212. 1888.

Coreopsis molokaiensis (Hillebr.) Drake del Cast. Ill. Fl. Ins. Mar. Pacif. 210. 1890.

Herba humilis, infra fruticosa; caule brevi subprostrato vel fere erecto, ad apicem ramoso; ramis parce dividentibus, saepe radicantibus, 1.5–3 dm. longis. Folia petiolata petiolis tenuibus 1.5–3 cm. longis, petiolo adjecto 2.8–7 cm. longa et 1–2.5 cm. lata, plerumque indivisa, ovata vel subdeltoidea, ad apicem subobtusa vel subacuminata, serrata, basi lata saepe subcordata; rarius plus minusve tripartita, foliolis latis, terminali quam lateralibus multo majore. Capitula solitaria, radiata, pansa ad anthesin 8 mm. alta et 1.5–2.5

cm. lata, pedunculata pedunculis tenuibus 1–2 dm. longis, disci floribus circ. 10–24. Involucri bracteae exteriores circ. 6–8, lineares vel lineari-lanceolatae, crassae, saepe plus minusve hispidae, saepe glandulo apiculatae, bracteas interiores paulo excedentes. Flores ligulati plerumque 8, flavi, ligula anguste obovati, apice plerumque lobati, circ. 0.8–1.2 cm. longi. Achaenia late linearia, recta, exalata, plus minusve ciliata, corpore 9–11 mm. longa, ad apicem (saepe setosa et) biaristata aristis acribus et superne retrorsum ciliatis, ± 1.5 mm. longis.

Type specimen: Collected by *William Hillebrand*, near seashore at Waikolu, on north shore of Island of Molokai, Hawaiian Islands, in 1870 (Berl.).

Distribution: Island of Molokai, Hawaiian Islands.

Specimens examined: *Urbain Faurie* 994, Kamalo, June, 1910 (Par.); *Otto Degener* 2868, rocky, dry, clay slopes, Kapale Gulch, May 6, 1928 (Berl.; Boiss.; Field, 4 sheets; Kew); *idem & Henry Wiebke* 2869, exposed, grassy cliff ledges several hundred feet above sea, Pohakunui, May 17, 1928 (Berl.; Boiss.; Field, 7 sheets; Kew); *iidem* 3004, Naiwa coastal cliffs, above Kalaupapa, June 18, 1928 (Field, 2 sheets; N.Y.); *C. N. Forbes* 523*Mo*, shore cliffs, Wailau Valley, September, 1912 (Bish.); *idem* 570*Mo*, Pelekunu Valley, September, 1912 (Bish.); *F. R. Fosberg* 9671, grassy clearing in forest, Wailau Valley, July 4, 1933 (Field); *Hillebrand*, seashore, Kalawau (Kalawao) and Waikolu, 1870 (type material, Berl., 2 sheets; Brit.; Gray; Kew); *Kazuto Nitta* (for *Otto Degener*) *& Henry Wiebke* 3174, on talus slope and cliffs exposed to ocean spray during storms, western side of Wailau Valley, August 11, 1928 (Berl.; Boiss.; Brit.; Field, 4 sheets; Kew; Mun.); *iidem* 3174*b*, eodem loco, August 5, 1928 (Berl.; Boiss.; Brit.; Del.; Field; Kew; Mun.); *J. Remy* 288, Molokai, 1851–1855 (Par.).

Bidens molokaiensis appears to hybridize with *B. Hillebrandiana*.[1]

EXPLANATION OF PLATE XXXVI

Bidens molokaiensis: a, flowering specimen, ×0.72; *b*, exterior involucral bract, ×3.6; *c*, interior involucral bract, ×3.6; *d*, ray

[1] We may cite here two collections: *Nitta & Wiebke* 3175, collected with 3173 (*B. Hillebrandiana*) and 3174 (*B. molokaiensis*), but in slightly higher, richer locality, August 11, 1928 (Field); *iidem* 3176, collected with 3173 and 3174, August 5, 1928 (Berl.; Brit.; Field, 3 sheets; Gray; Kew; Mo.; Mun.; U.S.). Mr. Otto Degener (in lit. September 18, 1928) regarded these as perhaps hybrids between *B. molokaiensis* and *B. Hillebrandiana*, and to me No. 3176 appears as almost certainly so. Mature achenes of each were planted in October, 1928, but failed to germinate.

BIDENS COSMOIDES (Gray) Sherff

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corolla, ×3.6; *e*, palea, ×3.6; *f*, disc floret, ×3.6; *g*, *h*, achenes (showing range of ciliation on same plant), ×3.6; *a–f*, from cotype in Hb. Kew; *g*, *h*, from *Remy* 288, in Hb. Par.

58. **Bidens cuneata** Sherff, Bot. Gaz. 70: 102 and *pl. 13*. 1920. Pl. XII, figs. *j–p*.

Frutex ramosus, verisimiliter 6–10 dm. altus, ramis dichotomis, tenuibus, infra foliosis, supra in pedunculos productis. Folia crassiuscula, rhomboideo-ovata, dentata (dentibus in unico latere plerumque 3–5), ad apicem acuta, ad basim anguste vel late cuneata, petiolata petiolis tenuibus 1–2 cm. longis, petiolo adjecto 3–5 cm. longa et 1–2 cm. lata. Capitula solitaria, ligulata, pansa ad anthesin circ. 6 mm. alta et 2–2.5 cm. lata, pedunculis tenuibus 0.8–1.8 dm. longis. Involucri bracteae exteriores circ. 7, lineares, glabratae, glandulo-apiculatae, bracteas interiores subaequantes. Flores ligulati flavi, ligula late lanceolati, ad apicem denticulati, 8–11 mm. longi. Achaenia linearia, exalata, ad margines sparsissime ciliata, ad apicem ciliato-coronata, exaristata, 6–7 mm. longa.

Type specimen: Collected by *William Allanson Bryan*, at Diamond Head, Island of Oahu, Hawaiian Islands, December 6, 1903 (Bish.).

Distribution: Known only from type locality, Diamond Head, Island of Oahu, Hawaiian Islands.

Specimens examined: *Bryan*, Diamond Head, December 6, 1903 (type, Bish.).

EXPLANATION OF PLATE XII, FIGS. *j–p*

Bidens cuneata: j, fruiting branch, ×0.63; *k*, exterior involucral bract, ×4.41; *l*, interior involucral bract, ×4.41; *m*, ray corolla, ×4.41; *n*, palea, ×4.41; *o*, disc floret, ×4.41; *p*, achene, ×4.41; all from type.

59. **Bidens Saint-Johniana** Sherff, Bish. Mus. Occas. Paps. 12. No. 19: 12 and *pl. 6*. 1937.

Fruticosa, implicata decumbensve, glabra, ramosa. Folia petiolata petiolis alato-marginatis basi subconnatis ± 1 cm. longis, petiolo adjecto plerumque tantum 3–4 cm. longa et 1.7–3 cm. lata, ad ramorum apices plus minusve adgregata, rhomboideo-orbiculata, apice saepius rotundata, supra medium acerrime serrata dentibus mucronatis inflexisque (saepius 3–12 pro utraque margine), inde usque ad basim (petiolo incluso) angustata lateribus concavis, membranacea. Capitula solitaria vel subsolitaria pedunculis tenuibus

glabris ± 1 dm. longis, radiata, pansa ad anthesin ± 3 cm. lata et ± 8 mm. alta. Involucri bracteae exteriores 5–8, saepe crassiusculae, anguste vel moderate oblongae vel oblongo-subobovatae, apice obtusae, tergo plurinervatae et glabrae sed saepe longitudinaliter rugosae, circ. 7–8 mm. longae; interiores ovatae, apice puberulentae, paulo breviores. Flores ligulati circ. 8, flavi, ligula oblongo-obovati, apice saepe obsolete denticulati, circ. 1.3 cm. longi. Paleae lineares, superne attenuatae coloratae que, circ. 6–8 mm. longae. Achaenia griseo-atra vel atro-brunnea, oblongo-linearia, obcompresso-tetragona, facie quaque 2-sulcata, costis marginibusque perspicue brevisetosa setis acerrimis plerumque antrorsis rarius retrorsis, exalata, recta vel subarcuata, corpore 6–9.3 cm. longa et 1–1.7 mm. lata, sub apice raro in rostrum crassum et ± 1 mm. longum angustata, apice biaristata; aristis erectis, tenuibus, 1–3.5 mm. longis, acerrime supra plerumque retrorsum infra saepe antrorsum hamosis.

Type specimen: Collected by *Harold St. John*, No. 15688, matted or trailing over basalt ledges or soil and guano, at altitude of 30 meters, Southeast Islet, Marotiri Islands, July 22, 1934 (Bish.).

Distribution: Southeast Islet, Marotiri (Maretiri or Bass) Islands.

Specimens examined: *Harold St. John* 15683, trailing, shallow soil on basalt, alt. 80 meters, the reduced state of drier, more exposed places, Southeast Islet, July 22, 1934 (Berl.; Bish.; Field); *idem* 15688 (type, Bish.: cotypes, Berl.; Field; Kew).

60. **Bidens Cosmoides** (Gray) Sherff, Bot. Gaz. 70: 98. 1920. Pl. XXXVII.

Coreopsis (*Campylotheca*) *Cosmoides* Gray, Proc. Amer. Acad. 5: 126. 1861.

Frutex erectus, valde sese extendens, 1.2–2.4 m. altus; ramis herbaceis, glabris, plus minusve quadrangulatis. Folia membranacea, ternata vel pinnata vel summa indivisa, petiolo adjecto 0.8–1.4 dm. longa; foliolis (3–5, raro etiam –9) lanceolatis vel ovato-lanceolatis, acuminatis, serratis, glabratis vel sparsissime hispidis, saepe ciliatis, lateralibus sessilibus vel indistincte petiolulatis, 4–7 cm. longis et 1.3–2.8 cm. latis, terminali paulo majore; petiolis tenuibus, plerumque fere glabris, 2–6 cm. longis. Capitula maxima, solitaria, cernua, longe pedunculata pedunculis demum circ. 6–9 cm. longis, ligulata, pansa ad anthesin 3–4 cm. alta et 5–6.5 (vel etiam –9) cm. lata. Involucri bracteae exteriores 8–10, foliaceae, oblongo-lanceolatae vel lineares, erectae vel reflexae, acutae vel subobtusae, plerumque ciliatae, 1–2 cm. longae, interioribus longiores.

BIDENS CLARENDONENSIS Britt.

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Flores ligulati 8–14, flavi, ligula oblanceolati, acriter 2–3-dentati, 3–4 cm. longi; disci floribus circ. 50, genitalibus praesertim stylo longissimo (circ. 3 cm. longo) valde exsertis. Achaenia matura non vidi; immatura linearia, exalata, plus minusve flexuoso-curvata, marginibus faciebusque hispidula, apice setuloso-coronulata et plerumque aristis 2 brevibus vel brevissimis munita.

Type specimen: Collected by the *United States Exploring Expedition* under *Captain Wilkes*, in mountains on Island of Kauai, Hawaiian Islands, 1840 (U.S.).

Distribution: Island of Kauai, Hawaiian Islands.

Specimens examined: *Otto Degener & Henry Wiebke* 2168, sunny slope in light forest, Halemanu, Kokee, June 27, 1926 (Berl.; Field, 3 sheets; Kew; Par.); *Urbain Faurie* 933, Waimea, March, 1910 (Brit.); *C. N. Forbes* 218*K*, Wahiawa Mountains, August, 1909 (Bish.); *idem* 785*K*, west side of Waimea Drainage Basin, July 3–August 18, 1917 (Bish., 2 sheets); *idem* 1085*K*, eodem loco et tempore (Bish.); *idem* 1698*K*, Kololau trail, Waimea Drainage Basin, July 3–August 18, 1917 (Bish.); *A. A. Heller* 2791, Kaholuamanoa, above Waimea, September 2–9, 1895 (Bish.; Brit.; Calif.; Corn.; Kew; Minn.; N.Y.; Par., 2 sheets; Phila.; U.S.); *A. S. Hitchcock* 15291 et 15388, alt. 1,080 meters, Kaholuamanoa, October 20, 1916 (U.S.); *J. M. Lydgate*, Kauai (Bish.); *Mann & Brigham*, alt. 900 meters, Waimea (Corn.); *iidem* 537, alt. 600–900 meters, Waimea (Brit.; Del.; Gray; Kew; U.S.); *J. Remy* 278, Hawaiian Isls., 1851–1855 (Gray); *J. F. Rock* 10291, Kaholuamanoa, October 20, 1911 (Gray, 2 sheets; Par.); *Mrs. Francis Sinclair, Jr.*, Hawaiian Isls. (Kew); *H. St. John, F. R. Fosberg, & V. Oliveira* 13699, 4–6 ft. tall, alt. 1,110 meters, edge of wet woods, Kokee, Waimea, Na Pali-Kona Forest Reserve, December 27, 1933 (Field); *U. S. Expl. Exped.* under *Capt. Wilkes*, Kauai (type, U.S.); *Heinrich Wawra*, Kauai (Berl.).

A strange and anomalous species. Not only are the acutely toothed, numerous rays and the large, wide involucral bracts distinctive but the style column is remarkably elongate and might with some botanists serve as a basis for a separate genus.

Hillebrand (Fl. Haw. Isls. 214. 1888) cites only the Island of Kauai for this species, listing the United States Exploring Expedition, Remy, Mann, and Knudsen as the collectors of it there. Gray's citation of the Island of Hawaii for the type, collected by the U. S. Exploring Expedition, was surely erroneous. The Gray Herbarium lacks a specimen of the type collection, but the type itself (U.S.) has "Mts., Kauai" on the label. The Sinclair plant, with "Hawaii"

on the label, doubtless came from Kauai. Mrs. Sinclair has illustrated this species elsewhere (Indig. Fl. Haw. Isls. *pl. 19.* 1885) and stated that the various species collected by her came from the islands of Kauai and Niihau.

According to Mrs. Sinclair, it is a "spreading bushy plant, five or six feet high, with twining, interlacing, branches, one plant covering from eight to ten feet of ground. It generally grows under the shade of the open forest, in the mountain regions at various heights above the sea, but seldom less than two thousand feet.

"In ordinary seasons it blooms in April and May, but occasionally flowers may be found as late as the end of June or beginning of July.

"The Poolanui [nomen incolarum] is quite a striking flower, not only on account of its size and colour, but also on account of the great number in bloom at the same time—giving the sombre forest quite a bright appearance during the spring months. It is a useful fodder plant, cattle and horses eating it with avidity, but it soon disappears if constantly eaten down."

EXPLANATION OF PLATE XXXVII

Bidens Cosmoides: a, flowering and fruiting branch, ×0.6; *b,* exterior involucral bract, ×1.81; *c,* interior involucral bract, ×1.81; *d,* ray corolla, ×1.81; *e,* palea, ×1.81; *f,* disc floret, ×1.81; *g,* anthers, ×7.26; *h,* upper portion of pistil, ×10.89; *i,* achene, ×1.81; *a,* from *Remy* 278, in Hb. Gray; rest from *Heller* 2791, in Hb. Mo. and Hb. Field.

61. **Bidens clarendonensis** Britt. Bull. Torr. Bot. Club 39:9. 1912. Pl. XXXVIII.

Perennis, glabra; caule repenti, subligneo, tereti, saepe 4 m. longo, ramoso ramis teretibus. Folia petiolata petiolis superne marginatis 1–3.5 cm. longis, petiolo adjecto 5–10 cm. longa, nitido-subcoriacea, valde odorata, indivisa, rhomboideo-ovata, grosse serrata 5–16 dentibus in unico latere, apice acuta, basi late cuneata, marginibus subindurato-revoluta et non ciliata, venis brunneis numerosis perspicue venata. Capitula perpauca, subumbellata, pedunculata pedunculis 0.5–2 cm. longis, radiata, pansa ad anthesin circ. 2.5 cm. lata. Involucrum glabratum vel hispidum; bracteis exterioribus 9–13, plus minusve biseriatim dispositis, late linearibus vel lineari-lanceolatis, acutis vel obtusis, rarenter paulum ciliatis, 8–11 mm. longis, 1.5–2 mm. latis, interiores saepe superantibus. Flores ligulati circ. 5, aurantiaco-flavi, ligula oblongi, apice integri

BIDENS MONTICOLA Poepp. & Endlich.

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vel saepius minute 2- vel 3-dentati, 1.5–2 cm. longi. Achaenia linearia, subtetragona, longitudinaliter omnino circ. 8-sulcata (unica facie plerumque 2-sulcata), glabra, corpore 8–10 mm. longa, breviter et saepe inaequaliter biaristata (vel una vel etiam duabus aristis saepe deficientibus); aristis nunc retrorsum hamosis hamis perpaucis, nunc calvis, usque ad 1 mm. longis.

Type specimen: Collected by *William Harris*, No. 10987, in Peckham Woods, at altitude of 750 meters, Upper Clarendon, Jamaica, July 7, 1911 (N.Y.).

Distribution: Known only from type locality at Upper Clarendon, Jamaica.

Specimens examined: *Harris* 10987 (type, N.Y.: cotype, Kew); *idem* 11180, alt. 750 meters, Peckham Woods, Upper Clarendon, Jamaica, September 27, 1912 (Field; Kew; Mo.; N.Y.).

EXPLANATION OF PLATE XXXVIII

Bidens clarendonensis: a, fruiting branch (one leaf drawn to show characteristic venation), ×0.69; *b*, exterior involucral bract, ×3.45; *c*, interior involucral bract, ×3.45; *d*, ray corolla, ×3.45; *e*, palea, ×3.45; *f*, disc floret, ×3.45; *g*, anthers, ×20; *h*, pollen grain, ×414; *i*, upper portion of pistil, ×20; *j*, achene, ×5.5; *a*, mainly from type; rest from *Harris* 10987, in Hb. Field.

62. **Bidens monticola** Poepp. & Endl. Nov. Gen. et Sp. 3: 49, *pl. 255*. 1845. Pl. XXXIX.

Bidens Rubifolia H.B.K. var. *monticola* Baker in Mart. Fl. Brasil. 6, pt. 3: 245. 1884.

Frutex valde dumosus, glaber, 1.2–2.5 m. altus; ramis erectis vel suberectis, teretibus, lignosis, principalibus plus minusve elongatis, ramulis oppositis vel potius trichotomis. Folia petiolata petiolis subalatis planis 0.7–2 cm. longis, petiolo adjecto 4–10 cm. longa et 1–3 cm. lata, oblongo-lanceolata vel rhomboideo-ovata, apice acuminata, basi cuneata in petiolum attenuata, marginibus argute et regulariter serrata, utrinque glaberrima, subtus in colorem sordide badium vergentia. Capitula terminalia, subcorymbosa vel etiam subracemosa, radiata, pansa ad anthesin circ. 1.5–2 cm. lata et 0.7–1.3 cm. alta, pedunculata pedunculis parvis, glanduloso-pubescentibus, viscosis, plerumque 1–4 cm. longis. Involucri insigniter glanduloso-pubescentis viscosique bracteae exteriores circ. 8–12, laxae, lineares, acutiusculae, 6–8 mm. longae, quam interiores erectae paululum longiores vel interdum multo breviores. Flores

ligulati circ. 6–8, ligula anguste obovati, apice rotundato obtuse bidentati, obscure flavi, circ. 1–1.2 cm. longi. Achaenia demum paleas superantia, linearia, subobcompresso-tetragona, atra, erecto-(et interdum tuberculato-) setosa, corpore ± 8 mm. longa et ± 0.8 mm. lata (forsan tantum immatura vidi?) apice spinulosa et biaristata; aristis retrorsum hamosis, circ. 1–1.5 mm. longis.

Type specimen: Collected by *Eduard Poeppig*, in calcareous, herb-covered, rather dry places in the mountains about Casapí (Cassapi), eastern Peru, 1829 (Mus. V.).

Distribution: Peru.

Specimens examined: *E. P. Killip & A. C. Smith* 24114, alt. 1,800–2,400 meters, thickets and open woods, Huacapistana, Dept. Junín, June 5–8, 1929 (Field); *iidem* 24249, eodem loco et tempore (Field); *Alexander Mathews*, Peru (Kew); *idem* 1757, Casapí (Kew; Oxf.; Petrop.); *Poeppig*, in mountains about Casapí (type, Mus. V.); *idem* 1715, Cochero (Berl.; Kiel; Mus. V.; Oxf.; Par.; Petrop.).

In general aspect simulating various Pacific Island species, such as *Bidens australis* Spreng. and *B. hawaiensis* Gray. The tetragonal achenes show that the species is very distinct from *B. Rubifolia* H.B.K., with which Baker (loc. cit.) associated it.

EXPLANATION OF PLATE XXXIX

Bidens monticola: a, flowering and fruiting branch, ×0.68; *b*, exterior involucral bract, ×3.4; *c*, interior involucral bract, ×3.4; *d*, ray corolla, ×3.4; *e* (outer, short-hairy), *f* (inner, glabrous), paleae, ×3.4; *g*, disc floret, ×3.4; *h*, achene (showing 2 normal and 2 rudimentary aristae), ×3.4; all from *A. Mathews*, Peru, in Hb. Kew.

63. **Bidens reptans** (L.) G. Don in Sweet, Hort. Brit. ed. 3. 360. 1839.[1] Pl. XL.

Coreopsis reptans L. Syst. Nat. ed. 10. 2: 1228. 1759; Amoen. Acad. 5: 381 (nomen) and 407. 1760; J. E. Smith, Spicilegium Bot. fasc. 2: 20 and *pl. 22*. 1791–1792.

Coreopsis viminea Browne ex Smith, op. cit. 20.

Coreopsis scandens Smith, loc. cit.

Coreopsis variifolia Salisb. Prodr. Stirp. Chap. Allert. 206. 1796.

Bidens Coreopsidis DC. Prodr. 5: 599. 1836.

[1] At a much later date, Hitchcock (Mo. Bot. Gard. Ann. Rept. 4: 101. 1893), evidently unaware of G. Don's previous transfer of the Linnean species to *Bidens*, made the transfer a second time.

Bidens Coreopsidis var. *reptans* (L.) DC. loc. cit.

Bidens Coriopsidis DC. ex Griseb. Fl. Brit. W. Ind. Isls. 720. 1864 (sphalm).

Bidens Rubifolia var. *Coreopsidis* (DC.) Baker in Mart. Fl. Brasil. 6, pt. 3: 245. 1884.

Bidens reptans f. *glabrescens* O. E. Schulz in Urban, Symb. Antill. 7: 139. 1911.

Coreopsis caracasana Willd. ex O. E. Schulz, op. cit. 140 (ex synon. *B. reptanti*).

Bidens reptans var. *bipartita* O. E. Schulz op. cit. 141.[1]

Folia principalia pinnatim 3- vel raro 5–7-partita. *B. reptans* sensu stricto.

Folia principalia plerumque 2–3-pinnatisecta.

Foliorum segmenta anguste vel late lanceolata, acute submucronato-dentata ..... var. *β. Urbanii.*

Foliorum segmenta linearia integraque ..... var. *γ. dissecta.*

Suffrutescens, scandens; caule volubili, ad basim quadrangulo vel demum subtereti, supra teretiusculo, setis brevissimis recurvatis sparsim vestito vel glabro, viridi vel purpurascenti, usque ad 6.5 m. (vel ultra) longo, ramoso ramis squarrosis pendulisve. Folia petiolata petiolis 1–3 cm. longis et saepe reflexis, petiolo adjecto 0.4–1 dm. longa, membranacea, supra glabrata vel rarissime sparsim pilosula, infra rarissime pubescentia vel tomentosula, interdum utrinque glabra (f. *glabrescens* O. E. Schulz), inferiora et summa simplicia, reliqua 3- vel raro 5–7-partita, foliolis serratis, interdum ciliatis, terminali oblongo-ovato vel lanceolato (saepe longe), acuminato, 2.5–8 cm. longo et 1–3.5 cm. lato; lateralibus minoribus, acutis vel acuminatis, basi inaequilaterali sessilibus vel breviter petiolulatis, ovatis vel ovato-lanceolatis, vel infimis raro ad latus superius segmento unico parvo sessili auctis vel trisectis (var. *bipartita* O. E. Schulz). Capitula radiata, apice ramulorum tenuiter pedunculata pedunculis nudis vel 1–3 prophyllis minutis obsitis 1–5 cm. longis, pansa ad anthesin 2–3 cm. lata et 7–11 mm. alta. Involucrum plus minusve hispidum; bracteis exterioribus 8–11, linearibus vel lineari-

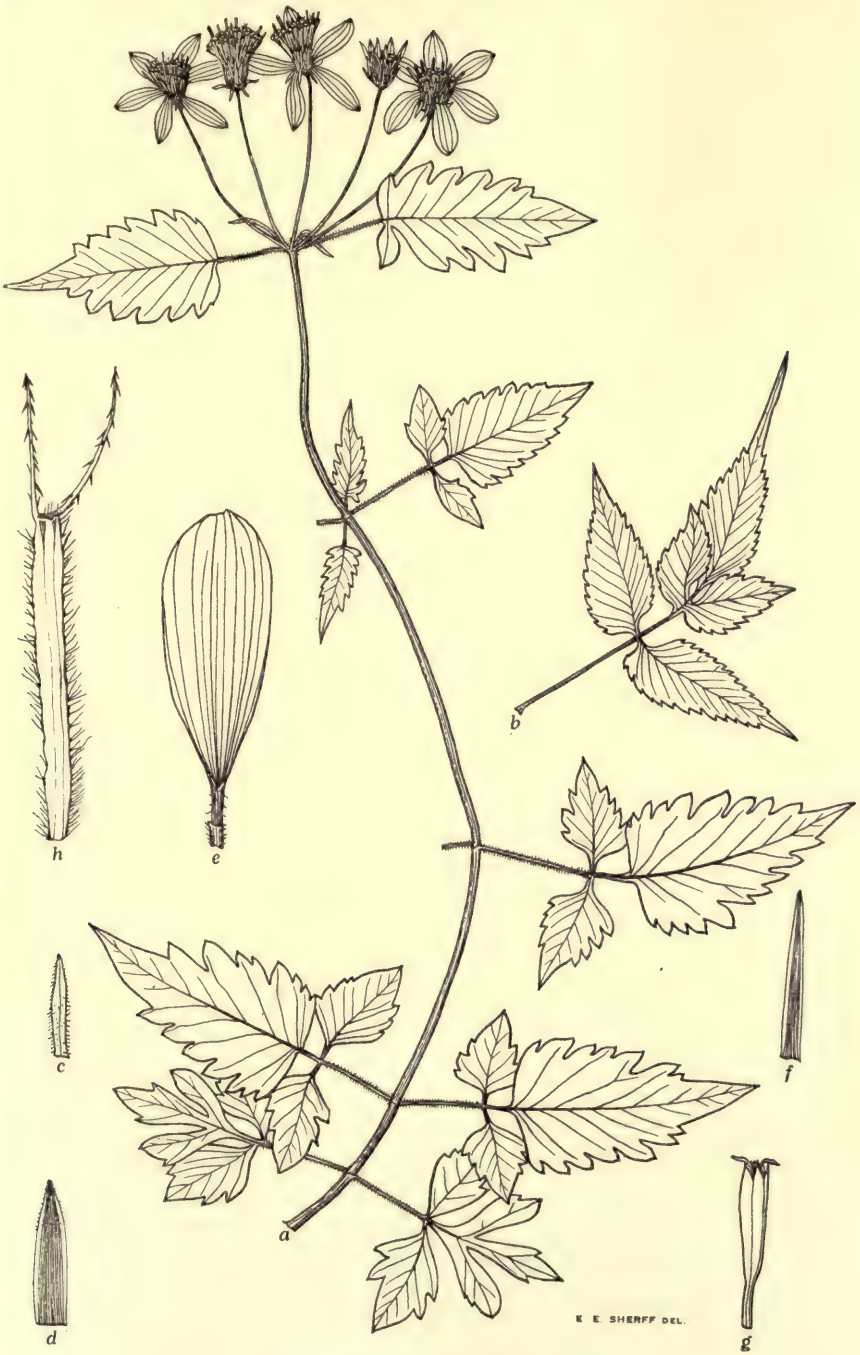
[1] The West Indian *Coreopsis chrysantha* L. (Sp. Pl. ed. 2. 2: 1282. 1763), omitted in the above synonymy, was based upon *Bidens* [*americana*] *triphylla, angelicae folio, flore radiato.* Plum. Cat. Pl. Amer. 10. 1703; Plum. Pl. Amer. ed. Burm. 1: 42, *pl. 53, fig. 1.* 1756. It is regarded by some (e.g., O. E. Schulz in Urban, Symb. Antill. 7: 140. 1911) as synonymous with *B. reptans.* The illustration given by Burmannus (Plum. Pl. Amer. loc. cit.) is very crude and inaccurate for *B. reptans*, yet its foliage aspect suggests that species more than any other *Bidens* of the West Indies. DeCandolle (Prodr. 5: 605. 1836) hesitatingly changed the Linnean name to *Bidens chrysantha* ("*Bidens? chrysantha*").

spathulatis, acutis, parce vel valde ciliatis, 4–8 mm. longis, quam interioribus anguste oblongo-lanceolatis brevioribus, demum patentibus recurvatisve. Flores ligulati 5–8, flavi, ligula elliptici vel anguste obovati, apice subemarginati vel acutiusculi, 1.2–1.7 cm. longi. Achaenia plana vel obcompresso-tetragona, linearia, nigrescentia, praesertim ad margines pilis erecto-patentibus plerumque 2–4-adgregatis et saepe tuberculo parvo insidentibus pilosa, biaristata (rarissime imperfecte triaristata); aristis tenuibus, maxima ex parte retrorsum hamosis, saepe ad basim antrorsum setosis, 2.5–4 mm. longis.

Type specimen: No single specimen was cited in the original description (Sloane, Cat. Pl. Jam. 125. 1696; idem, Voy. Jam. 1: 261, *pl. 154, figs. 2* and *3*. 1707). The first specimens studied, however, had been found by *Hans Sloane* in the inland forests of Jamaica, particularly upon the Red Hills, going to Guanaboa and on Mt. Diablo. The type illustration by Sloane (loc. cit.) is definite and characteristic, admitting of no doubt as to its application.

Distribution: West Indies, where apparently restricted to the islands of Cuba, Jamaica, Puerto Rico, Montserrat, Antigua, Martinique, and St. Vincent; very rare in southeastern Mexico (*Gaumer* 2083, State of Yucatan; *Kerber* 147, State of Vera Cruz) and Venezuela (*Linden* 487 p.p., Prov. of Mérida).

Specimens examined: *R. C. Alexander*, Jamaica, 1850 (Gray); *Anderson*, St. Vincent (Kew); *Belanger* 176, St. Pierre to Precheur, Martinique, May, 1853 (Del.); *Bertero*, Jamaica (Del., type of *Bidens Coreopsidis* DC.); *idem*, eodem loco (Mo., sub nom. *Coreopside chrysantha* W.); *N. L. Britton* 2621, hillside, Bower's Wood Road, vicinity of Bog Walk, Jamaica, April 2, 1908 (N.Y.); *idem & J. F. Cowell* 12789, vicinity of El Guero, Prov. Oriente, Cuba, March 18–19, 1912 (N.Y.; forma *Bidenti incisae* adpropinquans); *N. L. Britton & Arthur Hollick* 2001, alt. 500 meters, Bluefields Mt., Jamaica, March 6–7, 1908 (N.Y.); *Stewardson Brown* 145, vicinity of Mandeville, Jamaica, February 15–26, 1910 (N.Y.; Phila.); *Patrick Browne* (verisimiliter Antigua fide J. E. Smithii loc. cit.; Linn.); *Caley*, up the valley, St. Vincent, January 7, 1823 (Del.); *Joseph Crawford* 630, vicinity of Kingston, Jamaica, April 22–24, 1910 (N.Y.; Phila.); *idem* 636, eodem loco et tempore (N.Y.; Phila.; forma varietati *bipartitae* adpropinquans); *Cuming* 101, Jamaica (Mus. V.); *Père Duss* 1445, Martinique, 1881–1883 (Field; Mo.; N.Y.); *Eggers* 3437, alt. 360 meters, at Banana River, Jamaica, January 21, 1888 (Mun.); *idem* 6612, alt. 180–360 meters, Montrose Hills, St. Vincent, Decem-



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ber 26, 1889 (Mun.); *G. F. Gaumer* 2083, San Anselmo, Yucatan, Mexico (Field); *George P. Goll* 572, Guayama Road, Puerto Rico, November 18, 1899 (N.Y.); *L. Guilding*, St. Vincent (Kew); *Ludwig Hahn* 408, Piton de la Case-Pilote, Martinique, January, 1867–1868 (Berl.; Boiss.; Brit.; Del., 2 sheets; Gray; Kew; Mun.; Mus. V.; Par., 3 sheets; Phila.; U.S.; forma circumambitu foliorum *B. squarrosae* adpropinquans); *O. Hansen*, in mountains near Kingston, Jamaica, 1897 (Cop.); *William Harris* 5617, Yallab. Valley, Jamaica, December 13, 1893 (Brit.); *idem* 12303, alt. 570 meters, Hagley Gap, St. Thomas, Jamaica, December 20, 1915 (Brit.; Gray; Kew); *idem* 12209, Liguanea Ridge, St. Thomas, Jamaica, November 21, 1915 (Brit.; Field; Kew; Mo.); *A. A. Heller* 6081, on Adjuntas Road near Ponce, Puerto Rico, November 21, 1902 (Del.; Field; Mo.; Phila.); *idem & uxor* 874, on banks, Aibonito, Puerto Rico, March 22, 1899 (N.Y.); *Heustin*, Jamaica, 1730 (Brit.); *A. S. Hitchcock*, Blue Mountain Peak, Jamaica, December 12, 1890 (Mo.; forma tomentosa, foliis nunc indivisis nunc 3-partitis); *Theodor Holm* 61, alt. 350 meters, Las Mesas near Mayagüez, Puerto Rico, February, 1915 (Mo.); *E. Kerber* 147, Atoyac, Vera Cruz, Mexico, November, 1882 (Berl., 3 sheets; Brit.; Del.; Kew; Mus. V.; Par., 2 sheets; U.S.; forma *B. squarrosae* affinis et foliis plus minusve bipartitis atypica; nom. vernac. fide Kerberi Té de China); *J. J. Linden* 487 p.p, alt. 3,300 meters, Prov. Mérida, Venezuela, August, 1842 (Mus. V.); *March* 1198, Jamaica, 1858 (Kew); *Metcalfe*, Jamaica, 1859–1860 (Brit.); *Nicholson*, Antigua (Kew); *Purdie*, hedges and waste places, Manchester, Jamaica, November, 1873 (Kew); *Rose, Fitch, & Russell* 3425, Antigua, February 4–16, 1913 (Field; Gray; forma follis plus divisis); *Ryan*, Montserrat (Cop.); *J. A. Shafer* 319, Elberton, Montserrat, January 29, 1907 (Carn.; Field; N.Y.); *idem* 8943, Firmeza to Gran Piedra, Prov. Oriente, Cuba, March 4–5, 1911 (N.Y.); *R. Shakespear*, Jamaica (Brit.); *Sieber* 331, Martinique (Berl., 4 sheets; Kew; Kiel; Mo.; Mun.; Mus. V., 3 sheets; Par.; U.V.); *P. Sintenis* 387*b* pro parte, on slopes of Mt. Montoso (Cerro Montuoso) near Maricao, Puerto Rico, November 23, 1884 (Berl.; Brit.; Kew; type material of var. *bipartita* O. E. Schulz); *idem* 2919, between Aibonito and Algarrobo, Puerto Rico, December 2, 1885 (Berl.; Gray; Kew; Mun.); *idem* 5576, in forests at the Río Grande, Aguada, Puerto Rico, December 4, 1886 (Berl.; Boiss.; Del.); *H. H. & G. W. Smith* 1220, common in dry forests or second-growth thickets, alt. from near sea level to 300 meters, leeward side and southern end of St. Vincent, December–February (Gray); ***F. L.***

Stevens & W. E. Hess 4278, Manatí, Puerto Rico, November 5, 1913 (N.Y.); *J. A. Stevenson,* Garrochales, Puerto Rico, December 6, 1914 (Gray); *Wilson,* Jamaica (Kew); *Charles Wright* 314 pro parte, eastern Cuba, 1856–1857 (Gray; Kew); *Wullschlägel* 317, in shady places among bushes, Antigua, 1849 (Mun.).

The bibliographic status of *Bidens reptans* is very definite and rests upon a direct and positive chain of synonyms going back to pre-Linnean literature. G. Don (loc. cit.) based his name *B. reptans* (1st) upon plate 22 of Smith's *Spicilegium* and (2nd) upon *Coreopsis reptans* L. Smith's plate is seen to represent the common tripartite-leaved form shown also in my own plate (q.v.). From a perusal of Smith's text, it is seen further to have been drawn necessarily from cultivated material raised in the hothouse, from seed received from Jamaica by the Marchioness of Rockingham. Smith's plant is the same species as the single Linnean specimen, still extant, of *Coreopsis reptans* L. (Linn.).[1] It is the same, too, as the species illustrated in Sloane's Voy. Jam. *pl. 154, figs. 2, 3* (1707), the single reference given by Linnaeus, together with a harmonious description, when he first published the name *Coreopsis reptans* (Syst. Nat. ed. 10. 2: 1228. 1759). Thus the two references given by Smith go back clearly to the same species. Don's use of the Linnean name *reptans* leads in any case back to the first Linnean publication of the name, based upon Sloane's plant. From Sloane's text (Voy. Jam. 1: 261. 1707) we see that Sloane's plant was the *"Chrysanthemum trifoliatum scandens, flore luteo, semine longo, rostrato"* reported in his earlier *Catalogus Plantarum Jam.* (p. 125. 1696) to have been found in the inland forests of Jamaica. In his later work he cites it definitely as growing "among the Trees and Shrubs on the *Red Hills* going to *Guanaboa,* on Mount *Diablo,* and the other inland woody parts of this island." The type locality for *B. reptans* is seen, then, to be the inland forests of Jamaica, especially those on the Red Hills and on Mt. Diablo.

Coreopsis viminea was merely a manuscript name which Smith found to have been given by Browne, in an unpublished Flora, to our

[1] The sheet in the Linnean Herbarium has the letters *Br* and the name *Coreopsis reptans.* The letters *Br* stand for *Browne,* according to the distinguished Linnean student, Dr. B. Daydon Jackson (coram mense Julio, anno 1914). This sheet bears, then, the plant referred to by Smith (loc. cit.). According to Smith it had been sent in *Dr.* [*Patrick*] *Browne's* herbarium to Linnaeus and *later was erroneously considered by Linnaeus* [Amoen. Acad. 5: 407. 1760] *as representing the second Verbesina of Browne's Civil and Natural History of Jamaica* (p. 319. 1756). *Browne's* second *Verbesina* was evidently a very different plant and the Browne Jam. reference has justly been rejected by a long line of botanists since Smith's time.

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Bidens reptans. *C. variifolia* Salisb. was based directly upon material growing wild in Jamaica and collected by William Browne. Salisbury gave "*C. reptans* Linn. Sp. Pl. ed. 2. p. 1281" as a synonym.

Bidens Coreopsidis DC. was based upon the Jamaica material collected by Bertero; the original Sloane plant also was cited. *B. Coreopsidis* is seen to be clearly synonymous with *B. reptans*.

In leaf outline and in size of heads, *B. reptans* is highly variable. Typically the leaves are mainly three-parted, a few being simple. At times some or most of them have two or three pairs of lateral leaflets, with the lowermost leaflets tending to have on their upper edge a single miniature leaflet; this mere state is the var. *bipartita* O. E. Schulz.[1] Again, forms are found (e.g., *Rose, Fitch, & Russell* 3425, Antigua) with the leaves grading into the bipinnatisect type and approaching too closely specimens that, beyond dispute, are *B. Urbanii* Greenm. In fact, O. E. Schulz (in Urban, Symb. Antill. 7: 141. 1911) referred *B. Urbanii* Greenm. as a variety to *B. reptans*. In a former paper (Bot. Gaz. 56: 493. 1913), I expressed the opinion that *B. Urbanii*, as well as the sister forms *B. dissecta* and *B. Brittonii*, should be classed as separate species. An examination of numerous additional specimens has since compelled the conclusion that *B. Urbanii* and *B. dissecta* are best treated as mere foliage varieties of *B. reptans*, while *B. Brittonii* must be regarded as varietally the same as the *Urbanii* material, differing only in its pronounced foliar pubescence.

Bidens reptans var. *β*. **Urbanii** (Greenm.) O. E. Schulz in Urban, Symb. Antill. 7: 141. 1911. Pl. XLI and Pl. XLII, figs. *a–h*.

Coreopsis scandens Sessé & Moc. Fl. Mex. ed. 2. 194. 1894 (pro parte, ex una planta in Herb. Field; cf. *B. squarrosam*).

Bidens Urbanii Greenm. Field Mus. Bot. 2: 271. 1907.

Bidens mexicana Sherff, Bot. Gaz. 56: 491. 1913.

Bidens Brittonii Sherff, op. cit. 492.

Bidens reptans var. *Brittonii* (Sherff) O. E. Schulz, Repert. Sp. Nov. 26: 111. 1929.

Folia circumambitu triangulari-ovata, petiolo adjecto 3–11 (interdum etiam usque ad 15) cm. longa; nunc pinnatim 5- vel 7-partita foliolis ovatis lanceolatisve; nunc et saepissime bi- vel tripinnatisecta, segmentis anguste vel late lanceolatis et acute submucronato-dentatis, interdum ciliata, supra glabra vel minute

[1] Regarding the too numerous transitional forms between *B. reptans* and *B. squarrosa*, most of them more or less like this "var. *bipartita*," see under *B. squarrosa*.

sparsimque hispidula vel moderate pubescentes, infra glabra vel subglabra vel rariter valde tomentosa. Capitula radiata vel rarissime discoidea. Involucrum glabrum vel inferne parce hispidum; bracteis exterioribus 7–9, linearibus vel lineari-spathulatis, acutis vel subobtusis, interdum ciliatis, squarroso-reflexis, 3–4.5 mm. longis; interioribus oblongo-lanceolatis, quam exterioribus fere dimidio longioribus. Flores ligulati plerumque 5, pallide flavi, ligula oblanceolati vel anguste oblongi, 1–1.5 cm. longi, apice acuti vel subobtusi, integri. Achaenia linearia, nigra, erecta vel vix recurvata, obcompresso-tetragona, ad margines et interdum ad costas medias pilis saepe 2–4-adgregatis et plerumque tuberculo minimo insidentibus ciliata, corpore 7–12 mm. longa, demum paleas multo superantia, biaristata (vel rarissime tri- vel quadriaristata? —cf. Greenm. loc. cit.); aristis subflavidis, retrorsum vel ad basim saepe antrorsum hamosis, 2–3 mm. longis.

Type specimen: Collected by *Paul Sintenis*, No. 387, on the slopes of Mt. Montoso (Cerro Montuoso), near Maricao, northwestern Puerto Rico, November 23, 1884 (Field).

Distribution: Islands of Puerto Rico and Cuba; also in southern Mexico and Guatemala.

Specimens examined: *N. L. Britton* 3654, hillside, Parish of St. Thomas, Jamaica, September 15–19, 1908 (N.Y.); *idem & J. F. Cowell* 1559, Monte Mesa, Mayagüez, Puerto Rico, February 14–15, 1914 (Gray; N.Y.; sine radiis); *iidem* 4115, mountain forest, Monte Montoso (Cerro Montuoso), Puerto Rico, February 13, 1915 (N.Y.; vinea 8 m. longa); *iidem & Shafer* 12955, alt. 100 meters, river valley, Ensenada de Mora, Prov. Oriente, Cuba, March 26–29, 1912 (N.Y.); *E. A. Goldman* 468, Apazote, near Yohaltún, Campeche, Mexico, December 20, 1900 (U.S.); *W. Hancock* 35, in woods, between Acapulco and Puerto Nuevo, Guerrero, Mexico, November 13, 1882 (Kew); *Theodor Holm* 61*a*, alt. 350 meters, Las Mesas, near Mayagüez, Puerto Rico, December, 1914 (Field; Mo.); *E. Langlassé* 689 p.p., alt. 300 meters, southern Mexico, December 2, 1898 (Kew); *León, Clement, & Roca* 9820, alt. about 800 meters, Cobre Range of Sierra Maestra, Cuba, July 11–August 14, 1921 (N.Y.); *Ynes Mexia* 1305, slightly ill-smelling, alt. 100 meters, near Río de Cuale, Puerto Vallarta, Jalisco, December 17, 1926 (Mo.; Stanf.); *J. G. Ortega* 6108, Mezcaltitán, Santiago Ixc., Nayarit, Mexico, January, 1926 (Stanf.); *Edward Palmer* 95, vicinity of Acapulco, Guerrero, Mexico, October, 1894–March, 1895 (Field; Gray; Kew; type material of *Bidens mexicana* Sherff); *Sessé, Mociño, Castillo, &*

BIDENS REPTANS var. URBANII (Greenm.) O. E. Schulz (figs. *a–h*)
var. DISSECTA O. E. Schulz (figs. *i–s*)

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Maldonado 2915 (labeled also 1724), Mexico, 1787–1804 (Field; sub nom. *Coreopside scandenti*); *P. Sintenis* 387 (type, Field: cotypes, Berl., 2 sheets; Boiss; Brit.; Carn.; Del.; Kew; Mo.; Mun.; Mus. V.; Par.; U.V., etc.); *F. L. Stevens & W. E. Hess* 4873, Maricao, Puerto Rico, November 18, 1913 (N.Y.); *H. Von Tuerckheim* 8237, alt. 350 meters, Cubilquitz, Dept. Alta Verapaz, Guatemala, January, 1902 (Berl.; Gray; Kew; Mo.; Mun.; U.S.); *Charles Wright* 314 pro parte, eastern Cuba, 1856–1857 (Gray; N.Y.).

The leaves of the type material of *Bidens mexicana* Sherff have the leaflets much larger and simpler than do those on the type material of *B. Urbanii* Greenm. Goldman's material from the State of Campeche, Mexico (and cited by Greenman) has, however, leaflets of both sorts. It clearly effaces all foliage distinctions between the two and indicates definitely their common identity. In fact, several cotypes of *B. mexicana* have been observed with leaves very finely divided, grossly different from those on the type of *B. mexicana* (Field) but similar to those on the type and cotypes of *B. Urbanii*. While *B. mexicana* must, therefore, be reduced to synonymy with *B. Urbanii*, it is interesting to note in particular the scantily divided leaves on the type of the former. Some of these are seen to be 5-partite as in *B. reptans* "var. *bipartita*" O. E. Schulz and to offer a strong gradation through that form to *B. reptans*. The floral and fruiting characters in many specimens run too closely into those of *B. reptans*. Therefore, as stated above, it has seemed wiser to adopt O. E. Schulz's course and rank these forms under *B. reptans*, as the var. *Urbanii* (Greenm.) O. E. Schulz.

The type specimen of *B. Brittonii* Sherff, as also the cotype in the Columbia College Herbarium (N.Y.), was mounted upon the same sheet with a specimen of *B. reptans* proper.[1] Upon the sheet was written, evidently in Torrey's handwriting, "2 species," while, just below, Gray had written, "no. A. Gr." In his diagnosis of Wright's plants, Gray treated this form as a variety of *B. reptans* with dissected leaves. But the fact that the leaves are pubescent above and strongly tomentose beneath, as well as finely dissected, made it seem certain to me in 1913, when studying these plants, that two species had been confused and that Torrey's assumption was correct. Dr. N. L. Britton, to whom the material was shown for examination, came to a similar conclusion and later I named the form with dissected foliage in his honor. Since then, however, the finding of specimens of *B. reptans* with tripartite but pubescent-

[1] Wright's No. 314 in the Kew Herbarium is all *B. reptans* proper.

tomentose leaves and the finding of evidence that the parallel forms *B. Urbanii* and *B. dissecta* are reducible to varietal rank under *B. reptans*, have led to the conclusion that *B. Brittonii* is only a variety of *B. reptans*, and best equated with var. *Urbanii*.

Bidens reptans var. γ. **dissecta** O. E. Schulz in Urban, Symb. Antill. 7: 142. 1911. Pl. XLII, figs. *i–s*.

Bidens dissecta (O. E. Schulz) Sherff, Bot. Gaz. 56: 493. 1913.

Bidenti reptanti var. *Urbanii* similis sed foliorum dissectione validior; foliolis 3–4 jugis, plerumque tripinnatisectis, segmentis linearibus integrisque.

Type specimen: Collected by *William Harris*, No. 5420, weed along roads at altitude of 810 meters, near Moy Hall in Blue Mountains, Jamaica, November 9, 1894 (Berl.).

Distribution: Known only from Jamaica.

Specimens examined: *Harris* 5420 (type, Berl.: cotype, N.Y.); *idem* (similiter) 5420, alt. 1,500 meters, Portland Gap, November 16, 1894 (Field); *idem* 12302, alt. 600 meters, climbing among shrubs, roadside banks, Cedar Valley, St. Thomas, December 20, 1915 (Brit.; Kew; Mo., 2 sheets; N.Y.; Phila.); *C. R. Orcutt* 3830, Arntully, November 9, 1927 (Stanf.); *E. E. Sherff*, cult. ex unico achaenio e Harrisio 12302, Chicago, Illinois, 1916–1920 (Field, etc.; multis speciminibus).

In December, 1915, the late William Harris, Superintendent of Public Gardens for the Department of Agriculture in Jamaica, very kindly made a journey to collect specimens of this variety for me. Material obtained then at Cedar Valley, St. Thomas (eastern Jamaica) was found to match the type material very closely. Characteristically, the primary leaflets or their immediate subdivisions were seen to be deeply toothed, giving them a more or less pectinate appearance. A mature achene was planted and from cuttings of the resulting vine many plants were obtained. These were transferred in the autumn to a greenhouse. Some individuals were kept two years. They flowered profusely but did not produce fruit. Their leaflets were finely divided and lacked the pectinate appearance mentioned (which is shown in my plate). They differed from the leaflets of var. *Urbanii* only in having the segments narrower, making it appear doubtful if more than varietal distinction between the two will ever be considered justified.

EXPLANATION OF PLATE XL

Bidens reptans: a, flowering branch, ×0.7; *b*, a more compound leaf (var. *bipartita* O. E. Schz.), ×0.7; *c*, exterior involucral bract,

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×3.5; *d*, interior involucral bract, ×3.5; *e*, ray floret, ×3.5; *f*, palea, ×3.5; *g*, disc floret, ×3.5; *h*, achene, ×3.5; *a*, from *C. Wright* 314, in Hb. Kew; *b*, from *Sintenis* 387*b*, in Hb. Kew; rest from *Heller* 6081, in Hb. Field.

EXPLANATION OF PLATE XLI

Bidens reptans var. *Urbanii: a*, flowering branch, ×0.6; *b*, more compound leaf, ×0.6; *c*, exterior involucral bract, ×9.1; *d*, interior involucral bract, ×9.1; *e*, ray floret, ×3.04; *f*, palea, ×4.25; *g*, disc floret, ×4.25; *h*, achene, ×3.64; *b*, from cotype in Hb. Mo.; rest from 2 sheets of *Palmer* 95 (type material of *Bidens mexicana* Sherff), in Hb. Field.

EXPLANATION OF PLATE XLII

Bidens reptans var. *Urbanii*, figs. *a–h: a*, leafy branch, ×0.67; *b*, portion of leaf, enlarged to show pubescence, ×6.73; *c*, exterior involucral bract, ×4.04; *d*, interior involucral bract, ×4.04; *e*, ray corolla, ×2.69; *f*, palea, ×4.04; *g*, disc floret, ×4.04; *h*, achene, ×3.37; all from *C. Wright* 314 pro parte (type collection of *Bidens Brittonii* Sherff), *a–g* in Hb. Gray and *h* in Hb. N.Y.

Bidens reptans var. *dissecta*, figs. *i–s: i*, fruiting branch, ×0.67; *j–m*, various cauline leaves, ×0.67; *n*, exterior involucral bract, ×4.04; *o*, interior involucral bract, ×4.04; *p*, ray corolla, ×2.69; *q*, palea, ×4.04; *r*, disc floret, ×4.04; *s*, achene, ×3.37; *i–k* and *m–s*, from *W. Harris* 12302, in Hb. Field; *l*, from cotype in Hb. N.Y.

64. **Bidens incisa** (Ker) G. Don in Sweet, Hort. Brit. ed. 3. 360. 1839. Pl. XLIII.

Coreopsis incisa Ker, Bot. Reg. 1: *pl. 7*. 1815.

Bidens Coreopsidis var. *incisa* (Ker) DC. Prodr. 5: 599. 1836.

Bidens reptans (L.) G. Don var. *tomentosa* O. E. Schulz in Urban, Symb. Antill. 7: 141. 1911.

Herba perennis, scandens; caule fruticoso, tereti, dense pubescenti, ramoso, verisimiliter 2–6 m. longo. Folia parva, tenuiter petiolata petiolis 1–2.5 cm. longis, petiolo adjecto 3–7 cm. longa, pinnatim 3–5-partita vel summa indivisa, foliolis submembranaceis, serratis vel valde inciso-dentatis, supra pilis articulatis subadpresse pilosis et flavido-viridibus, infra dense tomentosis et albidis; terminali lanceolato vel ovato-lanceolato, acuminato, 4–11 dentibus in unico latere; lateralibus anguste ovatis, acutis. Capitula ramulos superiores caulemque terminantia, umbellate cymosa, radiata, pansa ad anthesin 1.5–2 cm. lata et 8–11 mm. alta, pedunculata pedunculis tantum

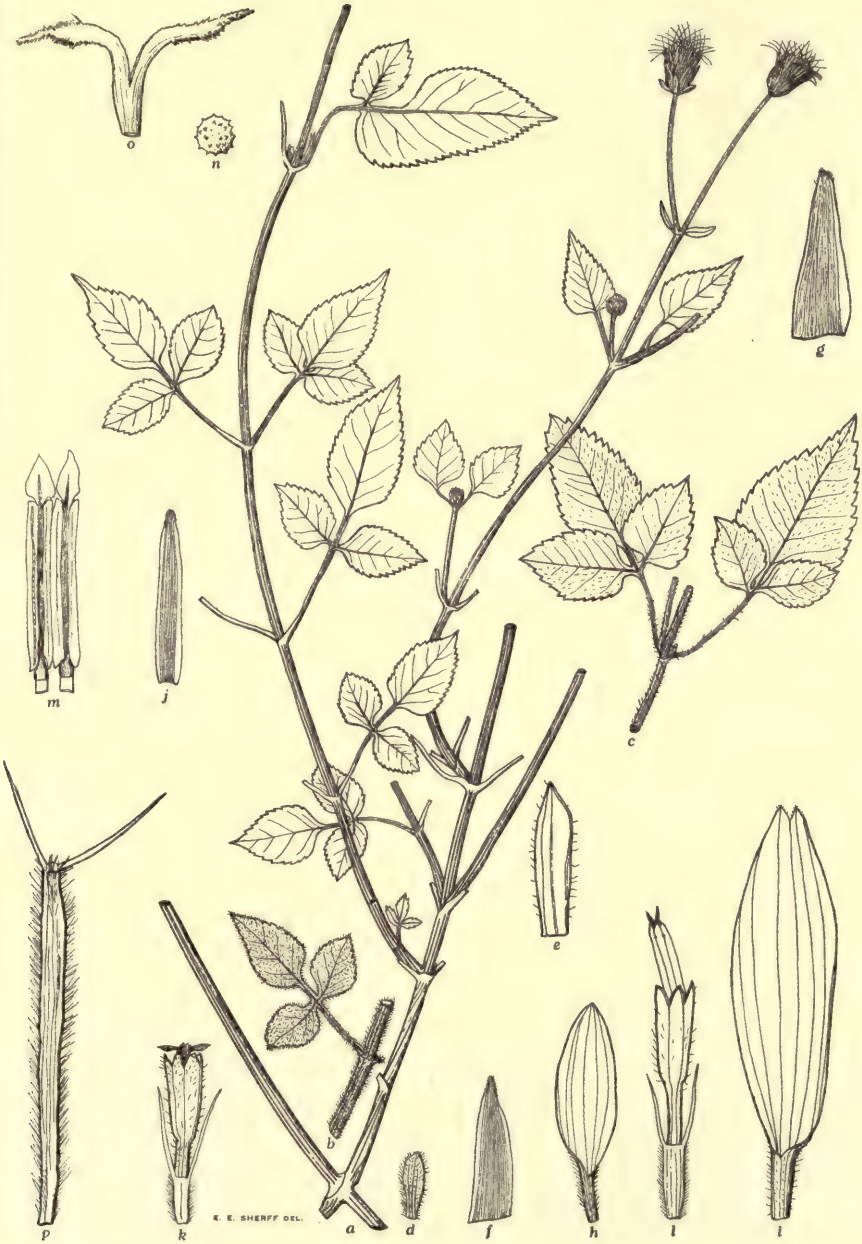
0.5–4 cm. longis. Involucri basis dense tomentoso-hispida; bracteis exterioribus 7–10, linearibus, acutis, tomentoso-hispidis, patentibus vel reflexis, 3–4 mm. longis; interioribus lineari-lanceolatis, piloso-hispidis, quam exterioribus dimidio longioribus. Flores ligulati circ. 5, flavi, ligula ovali-lanceolati, ad apicem subacuti et integri, ± 1.5 cm. longi. Achaenia linearia, plana vel obcompresso-tetragona, nigra, marginibus et interdum costis mediis piloso-ciliata, corpore 7–10 mm. longa, biaristata aristis plerumque de apice fere usque ad medium retrorsum hamosis sed aliter antrorsum hamosis, 1.5–2 mm. longis.

Type specimen: Raised from seed from Jamaica, about 1812, in the nursery of Messrs. Colville, King's Road, Chelsea, England; represented by the colored plate which Sydenham Edwards prepared from the "one living specimen" seen by Ker (Bot. Reg. 1: *pl.* 7. 1815).

Distribution: Jamaica.

Specimens examined: *Alexander* (postea *Prior* appellatus, fide J. Hutchinsonii apud Herbarium Kewensem), coffee region, Blue Mts., November 28, 1850 (Kew); *Mrs. E. G. Britton* (N. Y. Bot. Gard. Explor. Jamaica No.) 3824, near Clydesdale, Blue Mts., September, 21–24, 1908 (N.Y.); *eadem* (N. Y. Bot. Gard. Explor. Jamaica No.) 3867, near Marce's Gap, Blue Mts., October 3, 1908 (N.Y.); *N. L. Britton* (N. Y. Bot. Gard. Explor. Jamaica No.) 73, banks, St. Helen's Gap, vicinity of Cinchona, September 2–10, 1906 (N.Y.); *William Harris* 11649, alt. 1,470 meters, Cinchona, September 20, 1913 (Brit.; Field; Kew; Man.; Mo.; Par.; Phila.); *idem* 12327, alt. 1,500 meters, over shrubs and low trees, Cinchona, February 4, 1916 (Brit.; Kew; Mo.; N.Y.; Par.; Phila.); *J. H. Hart*, Jamaica (Field); *William Maxon* 1138, alt. 1,050 meters, dryish roadside, near Silver Hill Gap, April 15–16, 1903 (U.S.); (commun.) *D. Morris*, alt. 1,650 meters, Cinchona plantations, August, 1886 (Kew, 2 sheets); *G. E. Nichols* 137, alt. 1,500 meters, Cinchona, July 26, 1903 (Mo.); *J. T. Rothrock*, alt. 1,125 meters, Blue Mountains, December 12, 1890 (Penn., 4 sheets); *idem* 458, Jamaica, 1890–1891 (Phila.); *Forrest Shreve*, Cinchona, October 25, 1906 (N.Y.); *Alexander Taylor* 4253, trail to St. Helen's Gap, vicinity of Cinchona, April 7, 1909 (N.Y.); *Wilson*, Jamaica (Kew).

Ker, as stated in a former article (Sherff, Bot. Gaz. 56: 494. 1913), very justly separated this species from the smooth-stemmed *B. reptans* (L.) G. Don. He laid too much stress, however, upon the "indented ray" of the latter species, this character varying too



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much to be of definite value. The external bracts were described as gibbous, but herbarium material fails to show this character to any noticeable extent.

B. reptans var. *tomentosa* O. E. Schulz, based on *Geo. E. Nichols* 137, is merely a synonym for *B. incisa*. In the Nichols plants, which had been found growing spontaneously, the terminal leaflets were less than "about two inches long" (the measure stated for the type specimen, raised in cultivation, of *B. incisa*).

EXPLANATION OF PLATE XLIII

Bidens incisa: a, flowering branch, ×0.64; *b*, portion of same, showing pubescence, ×1.1; *c*, exterior involucral bract, ×3.84; *d*, interior involucral bract, ×3.1; *e*, ray corolla, ×2.56; *f*, palea, ×3.84; *g*, disc floret, ×5.1; *h*, *i*, achenes, ×3.84; *a–g*, from *Nichols* 137 (cotypes of *Bidens reptans* var. *tomentosa* O. E. Schz.) in Hb. Mo. and Hb. Field; *h*, *i*, from *J. Hart*, in Hb. Field.

65. **Bidens squarrosa** H.B.K. Nov. Gen. et Sp. 4: 187 (238). 1820. Pl. XLIV and Pl. XLV, figs. *a–g*.

Bidens tereticaulis DC. Prodr. 5: 598. 1836.

Coreopsis trifoliata Bertoloni, Fl. Guat. 36. 1840.

Bidens antiguensis Coult. Bot. Gaz. 16: 100. 1891.

Coreopsis scandens Sessé & Moc. Fl. Mex. ed. 2. 194. 1894 (ex descript. et pro parte; cf. *B. reptans* var. *Urbanii*).

Bidens tereticaulis var. *sordida* Greenm. Proc. Amer. Acad. 39: 115. 1903.

Bidens tereticaulis var. *indivisa* Robins. Proc. Bost. Soc. Nat. Hist. 31: 270. 1904.

Bidens Coreopsidis var. *procumbens* Donn. Sm. Bot. Gaz. 42: 299. 1906.

Bidens tereticaulis var. *antiguensis* (Coult.) O. E. Schulz in Urban, Symb. Antill. 7: 142. 1911.

Perennis, scandens; caule fruticoso, tereti, ± 3.5 m. longo, ramoso; ramis teretibus, glabris vel tomentosis. Folia petiolata petiolis tenuibus 1–4 cm. longis, petiolo adjecto 4–15 cm. longa, principalia pinnatim 3–5-partita vel rarenter indivisa, summa indivisa; foliolis nunc ovatis, nunc ovato-lanceolatis, nunc lanceolatis, apice acutis acuminatisve, serratis, membranaceis, supra plerumque pilis brevibus conspersis et subtus pubescenti-hirtis, rarius glabratis vel densissime tomentosis, terminali petiolulato, lateralibus sessilibus vel subsessilibus. Capitula plerumque numerosa, terminalia, paniculata

vel racemoso-corymbosa, tenuiter pedunculata pedunculis 1–4 (–8) cm. longis nudis vel bracteolatis, radiata, pansa ad anthesin 1.5 etiam usque ad 4 cm. lata et 6–8 (vel etiam –15) mm. alta. Involucrum omnino hispidum vel glabratum supra; bracteis exterioribus 4–6, linearibus, apice indurato-apiculatis, 3–5 mm. longis, demum squarroso-reflexis, interiores oblongo-oblanceolatas subaequantibus. Flores ligulati 5 vel 6, flavi, ligula anguste elliptico-oblanceolati, apice integri vel minutissime denticulati et plerumque subacuti, 0.8–1.5 cm. longi. Achaenia linearia, plana vel obcompresso-quadrangularia, nigrescentia, marginibus pilis longis plerumque 2–4-adgregatis et saepe tuberculo parvo insidentibus ciliata, corpore 6–9 mm. longa, biaristata; aristis tenuibus, erectis vel divaricatis, retrorsum hamosis vel omnino nudis, 2–4 mm. longis.

Type specimen: Collected by *Alexander Humboldt* and *Aimé Bonpland* at altitude of 900 meters, between Caracas and Mt. Buenavista, Venezuela, January, 1799–1803 (Par.).

Distribution: From states of Tamaulipas and Jalisco, Mexico, southeastward through Central America and in South America to Peru, Bolivia, and southern Brazil; also on St. Vincent, Windward Islands.

Specimens examined: *Allart* 69, between Cotiza and Los Venados, near Caracas, Venezuela, October, 1924 (N.Y.); *idem* 457, alt. 1,800–2,000 meters, Colonia Tovar, Venezuela, December, 1924 (N.Y.; U.S.); *Ed. André* 103, La Guayra, Venezuela, November 25, 1875 (N.Y.); *C. F. Baker* 2121, Quesalguague, Dept. León, Nicaragua, January 17, 1903 (Calif.; Del.; Gray; Kew; Mo.; Mus. V.); *idem* 2214, Masaya, Dept. Masaya, Nicaragua, January–February, 1903 (Calif.; Del.; Gray; Kew; Mo.; Mus. V.); *Miguel Bang* 16, alt. 3,000 meters, vicinity of La Paz, Bolivia, 1889 (Phila.); *idem* 1406, Guanai-Tipuani, Bolivia, April–June, 1892 (Berl.; Boiss.; Brit.; Del.; Field; Kew; Mo.; Mun.; Mus. V.; Petrop.; Phila.; U.V., etc.); *Berlandier* 14, in woods between Tampico and Altamira, Tamaulipas, Mexico, January 30, 1827 (Del., 2 sheets; Flor.); *idem* 730, Tantoyuca, Vera Cruz, Mexico, December, 1830 (Gray; Par.); *idem* 2148, vicinity of Tantoyuca, Vera Cruz (Boiss.; Brit.; Del., 2 sheets; Phila.; Mus. V.); *idem* 2150, eodem loco, December, 1830 (Berl.; Del., 2 sheets; Gray); *Bernoulli & Cario* 1375, Retalhuleu, Dept. Retalhuleu, Guatemala, December, 1877 (Berl.; Kew); *iidem* 1519, eodem loco, January, 1876 (Berl., 2 sheets; Kew); *Bilimek* 203, Orizaba, Mexico, May, 1867 (Kew; Par., 2 sheets); *Biolley* 7028, near San Mateo, Costa Rica, January 18, 1892 (Boiss.; Gray); *Birschel*, near Guarenas,

BIDENS SQUARROSA H.B.K. (figs. *a–g*)
BIDENS VINCAEFOLIA Karst. & Schz. Bip. *ex* Sherff (figs. *h–m*)

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Venezuela, April, 1854 (Kew); *Botteri*, Mexico, 1856 (Del., 2 sheets); *idem* 443 and 444, Orizaba, Mexico, September, 1854 (Brit.; Par.); *idem* 489, eodem loco (Gray); *E. Bourgeau* 30, State of Vera Cruz, Mexico, September 5, 1866 (Par., 5 sheets); *idem* 1560, Valley of Córdoba, Vera Cruz, Mexico, December 12, 1865 (Del.; Gray; Kew; Petrop.); *idem* 3093, Orizaba, Mexico, October 3, 1866 (Kew; Par., 3 sheets); *Otto Buchtien* 1575, alt. 570 meters, near Mapiri, Bolivia, November, 1907 (Field); *Salvador Calderón* 169, San Salvador, Salvador, 1921 (Gray); *Cochburn*, Caracas, Venezuela (Brit.); *C. Conzatti* 122, alt. 1,200 meters, mountains of Oaxaca, Mexico, September 20, 1895 (Gray); *idem* 1581, alt. 1,800 meters, Cerro San Antonio, Oaxaca, Mexico, October 28, 1906 (Field); *idem* 2269, alt. 2,000 meters, Cerro San Felipe, Oaxaca, October 18, 1908 (Field); *idem & V. González* 1133, alt. 850 meters, Córdoba, Mexico, December, 1900 (Gray); *G. P. Cooper* 11, alt. 1,140–1,260 meters, Las Cóncavas, near Cartago, Costa Rica (Gray); *J. J. Cooper* 5814 p.p., alt. 1,275 meters, Cartago, Prov. Cartago, Costa Rica, December, 1887 (Mun.); *Padre Cornelio* 59, Maracay, Aragua, Venezuela, 1927 (U.S.); *C. C. Deam* 109, alt. 48 meters, Los Amates, Izabal, Guatemala, February 12, 1905 (Gray); *Eggers* 6612, alt. 180–360 meters, Montrose Hills, St. Vincent, West Indies, December 26, 1889 (U.V.; mihi non aliter e his insulis nota, tamen est vera *B. squarrosa*); *C. Ehrenberg* 55, Mexico (Berl.); *Endrés* 1, alt. 1,050 meters, Costa Rica (Mus. V.); *idem* 45, Costa Rica (Kew); *idem* 133, alt. 1,200 meters, Costa Rica (Mus. V.); *L. C. Ervendberg* 67, Wartenberg, near Tantoyuca, Vera Cruz, Mexico, November, 1858 (Del.; Gray; Par.; Phila.); *A. Fendler* 41, near Tovar, Venezuela, 1854–1855 (Del., 2 sheets; Gray; Kew; Mo.; Phila.); *idem* 696 and 696*b*, Venezuela (Gray); *H. Galeotti* 2212, mountains, State of Vera Cruz, Mexico, October–December, 1840 (Par.); *idem* 2340, moist woods on mountains, eodem loco, October–November, 1840 (Del.; Par.); *idem* 2471, mountains, State of Oaxaca, Mexico, about 1840 (Del.; Par.); *idem* 2493, eodem loco (Del.; Par.); *George Gaumer*, Izamal, Yucatan, Mexico, 1888 (Kew, 2 sheets); *idem* 951, eodem loco (Berl.; Gray; Kew); *idem et filii* 23510, Xnocac, Yucatan, December, 1916 (Brit.; floris aromaticissimis fide Gaum. et ff.); *E. A. Goldman* 30, near Metlaltoyuca, Puebla, Mexico, January 27, 1898 (Gray); *idem* 493, Apazote, Campeche, Mexico, December 28, 1900 (U.S.); *W. Hancock*, Guatemala, 1882–1883 (Kew); *E. T. Heyde* 666, Guatemala, 1892 (U.S.); *idem & Lux* 4193, alt. 1,650 meters, Buena Vista, Dept. Santa Rosa, Guatemala, December, 1892 (Berl.; Field; Kew;

Mo.); *C. Hoffmann* 383, Valley of Río Legardo, Costa Rica (Gray, type of *Bidens tereticaulis* var. *sordida* Greenm.); *E. W. D. Holway* 4, alt. 1,500 meters, Guatemala City, Guatemala, December 31, 1914 (Gray); *idem* 110, alt. about 1,500 meters, Sololá, Guatemala, January 25, 1915 (Gray); *idem* 3667, State of Oaxaca, Mexico, October 18, 1899 (Gray); *Humboldt & Bonpland*, Caracas, Venezuela (Par., type); *Harry Johnson* 920, alt. 1,350 meters, Samac, Alta Verapaz, Guatemala, October 20, 1920 (U.S.; forma glabra foliis simplicibus, floribus e lectore suaveolentibus); *idem* 921, alt. 1,200 meters, Samac, October 20, 1920 (U.S.; forma tomentosa foliis simplicibus, elongatis, lanceolato-oblongis); *C. Jurgensen* 781, Mexico, 1843–1844 (Del.; Kew, 2 sheets); *W. A. Kellerman* 5341, El Rancho, Sierra de Las Minas, Dept. Baja Verapaz, Guatemala, January 6, 1906 (Field); *idem* 5351, alt. 1,205 meters, Morán, Dept. Amatitlán, Guatemala, February 11, 1905 (Field); *idem* 6118, Volcán de Acatenango, Dept. Chimaltenango, Guatemala, February 8, 1907 (Field); *idem* 8035, alt. 1,050 meters, El Rancho, Guatemala, January, 1908 (N.Y.); *E. P. Killip & T. E. Hazen* 2527, alt. 2,500–3,100 meters, forest, Old Quindío Trail, "La Ceja" to "Agua Bonita," Dept. Tolima, Colombia, August 2, 1922 (N.Y.; forma valde tomentosa); *iidem* 9527, eodem loco et tempore (U.S.); *E. P. Killip & A. C. Smith* 16896, alt. 2,800 meters, vicinity of California, Dept. Santander, Colombia, January 11–27, 1927 (U.S.); *iidem* 23769, thickets at about 700 meters alt., La Merced, Dept. Junín, Peru, May 29–June 4, 1929 (Field); *iidem* 25348, alt. 700 meters, dense forest, Río Paucartambo Valley, Dept. Junín, June 19, 1929 (Field); *E. Langlassé* 689 p.p., alt. 300 meters, Michoacán and Guerrero, Mexico, December 2, 1898 (Berl.; Gray; forma foliis 5-partitis et *B. reptanti* adpropinquans); *Lehmann* 8723, alt. 1,000–1,500 meters, Altamira and Suaza above Tolima, Colombia, December (Field; forma); *P. Lévy* 306, alt. 40 meters, forests about Granada, Nicaragua, December, 1869 (Cop., 2 sheets; Par.); *Liebmann* 621, Colipa, Vera Cruz, Mexico, 1841–1843 (Cop., 2 sheets); *idem* 622, Gualulu, Mexico, 1841–1843 (Cop., 2 sheets; Kew); *idem* 623, Ejutla, Oaxaca, Mexico, October, 1842 (Cop.); *idem* 628, Mirador, Vera Cruz, Mexico, 1841–1843 (Cop., 2 sheets; Par.); *idem* 629, eodem loco, October, 1841 (Cop., 2 sheets); *Lansberg*, Venezuela (Berl.); *J. Linden* 1172, Mirador, Vera Cruz, November, 1838 (Flor.; Kew); *C. L. Lundell* 136, Honey Camp, Orange Walk, British Honduras, 1928 (Gray); *J. F. Macbride* 3814, sunny thickets, about 1,800 meters, Yanano, Peru, May 13–16, 1923 (Field); *Maxon & Hay* 3162, alt. about 550

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meters, bank, vicinity of Secanquím, Dept. Alta Verapaz, Guatemala, January 4, 1905 (U.S.); *Moritz* 57, Caracas, Venezuela, January, 1843 (Berl.; Brit., 2 sheets); *E. W. Nelson* 1508, alt. 1,560–2,040 meters, Valley of Oaxaca, Oaxaca, Mexico, October 2, 1894 (U.S.); *idem* 1824, alt. 1,350–1,650 meters, 6 miles above Dominguillo, Oaxaca, October 30, 1894 (Gray); *idem* 3410, near Yajalón, Chiapas, Mexico, November 21, 1895 (Gray); *Gustavo Niederlein*, alt. 2,100 meters, Quezaltepec (Volcán de San Salvador), Salvador, January 9, 1898 (Berl., 2 sheets); *Oersted* 150, Costa Rica, 1851 (Kew); *idem* 182, Segovia, Nicaragua, 1851 (Kew); *C. R. Orcutt* 3031, Sanborn, Vera Cruz, Mexico, March–April, 1910 (Field; Mo.); *Otto* 515, Colombia (Kew); *Edward Palmer* 122, alt. about 15 meters, vicinity of Tampico, Tamaulipas, Mexico, January, 1910 (Brit.; Kew; Mo.; N.Y.); *idem* 713, Chapala, Jalisco, Mexico, October–November, 1886 (Boiss.; Brit.; Gray; Mo.; Par.; Phila.); *idem* 1116, San Luis Potosí to Tampico, Mexico, December, 1878–February, 1879 (Field; Kew; Phila., 2 sheets); *C. C. Parry & E. Palmer* (similiter) 1116, alt. 1,800–2,400 meters, Mexico, 1878 (Gray); *Emilio Pittier* 112, forest, mountains near Galipán, Federal District, Venezuela, October 25, 1921 (N.Y.; U.S.); *H. Pittier* 1838, alt. 600 meters, hedges about Copán, Honduras, January 9, 1907 (Field); *idem* 5912, alt. 1,100–1,700 meters, between Caracas and La Guayra, Federal Distr., Venezuela, February 28, 1913 (Berl.); *idem* 8243, alt. 800–1,200 meters, Lower Cotiza, near Caracas, Venezuela, October 26, 1918 (U.S.); *idem* 11250, alt. 1,400 meters, in bushes on hills above Los Teques, Miranda, Colombia, November 18, 1923 (Del.); *C. G. Pringle* 3373, extensively trailing over dry ledges, shrubs, etc., Tamasopo Canyon, San Luis Potosí, Mexico, November 28, 1890 (Berl.; Boiss.; Brit.; Carn.; Del., 2 sheets; Field; Kew; Man.; Mo.; Mun.; Mus. V.; Par.; Phila.; U.V., etc.); *C. A. Purpus* 3633, Zacuapan, Vera Cruz, Mexico, October, 1909 (forma foliis plerumque 5-partitis; Berl.; Brit.; Calif.; Del., 2 sheets; Field; Mo.; Par.); *J. N. Rovirosa* 70, vicinity of San Juan Bautista, Tabasco, Mexico, 1888 (Phila.); *idem* 688, in thickets between San Juan Bautista and Atasta, Tabasco, about 1890 (N.Y.; Phila.); *H. H. Rusby* 1642, alt. 600 meters, Guanai, Bolivia, May, 1886 (Boiss.; Brit., 2 sheets; Field; Kew; Mus. V.; Phila.); *A. de St. Hilaire* 1198, State of São Paulo, Brazil, 1816–1821 (Par., 2 sheets); *Sallé* 443, Orizaba, Mexico, September, 1854 (Berl.; Kew); *idem* 444, eodem loco (Berl.); *Salvin & Godman* 294, Dulmas, Guatemala, 1861 (Kew); *Carl Sartorius*, Mirador, Vera Cruz, Mexico (Par.); *L. Schlim* 255, alt. 1,050 meters,

Prov. Ocaña, Colombia, October (1846–1852; Brit.; Del.; Par.); *A. Schott* 145, Mérida, Yucatan, Mexico, December, 1864 (Brit.); *Seemann*, Panama (Brit.); (*Sello* 590 and 4548, once put here, are at least partly *B. segetum;*) *Sinclair*, Ecuador (Kew); *C. L. Smith* 298 and 633, alt. 1,650–1,800 meters, Monte Albán, near Oaxaca, Oaxaca, Mexico, October, 1894 (N.Y.); *idem* 587, Coatzacoalcos, Isthmus of Tehuantepec, Vera Cruz, Mexico, February 6, 1895 (Gray; Mo., 2 sheets); *H. H. Smith* 519, alt. 600 meters, Jiracasaca, Santa Marta, Colombia, October, 1898–1901 (Berl.; Brit.; Carn.; Del.; Field; Man.; Mo.; N.Y.; Par.; Phila.); *J. D. Smith* 2354, alt. 1,500 meters, Antigua, Dept. Zacatepéquez, Guatemala, April, 1890 (first and second type sheets of *Bidens antiguensis* Coult., Field; cotypes, Berl.; Kew; Mun.); *L. C. Smith*, alt. 1,800 meters, Rancho de Calderón, Oaxaca, Mexico, September 10, 1894 (Gray); *P. C. Standley* 19096, alt. 650–850 meters, vicinity of San Salvador, Salvador, December 20, 1921–January 4, 1922 (Gray); *idem* 20220, alt. 800–1,000 meters, vicinity of Ahuachapán, Dept. Ahuachapán, Salvador, January 9–27, 1922 (Gray); *idem* 21844, vicinity of Izalco, Dept. Sonsonate, Salvador, March 19–24, 1922 (Gray); *idem* 22603, dry slope along road from San Martín to Laguna de Ilopango, Dept. San Salvador, Salvador, April 1, 1922 (Gray); *H. Sydow* 1, Grecia, Costa Rica, January 17, 1925 (Field); *idem* 39, coffee plantation near San José, Costa Rica, January, 1925 (Field); *R. Tate* 172, 173, and 288, Nicaragua, 1867–1868 (Brit.); *Ad. Tonduz* 7058, alt. 1,100 meters, vicinity of San Francisco de Guadalupe, Prov. San José, Costa Rica, January, 1896 (Berl.; Boiss.; Gray; Kew; Mo.; Mun.); *idem* 7248, eodem loco, January 4, 1893 (Del.; Boiss.; Gray); *idem* 7265, banks of the Río María Aguilar near San José, Costa Rica, December 29, 1892 (Boiss.; Gray; Par.); *idem* 9850, environs of San Pedro del Mojón, Costa Rica, January, 1896 (Berl.; Brit.; Mun.);[1] *idem* 13600, thickets, Nicoya, Costa Rica, January, 1900 (Berl.; Brit.; Boiss.; Gray; Kew, 2 sheets); *L. V. Velasco* 8873, San Salvador, Salvador, December, 1905 (U.S.); *Von Christmar*, Campeche, Mexico (Berl.); *H. Von Tuerckheim* 297, in bushes, vicinity of Cobán, Dept. Alta Verapaz, Guatemala, December, 1879 (Mus. V., 2 sheets; U.V., 3 sheets); *idem* (similiter) 297, alt. 1,290 meters, eodem loco, May, 1886 (forma foliis pro maxima parte simplicibus; Berl.; Del.; Kew; N.Y.; Par., ubi foliis

[1] *Tonduz* 12284 (alt. 1,800 meters, forests, Mala Vía au Copey, Costa Rica, April, 1898; Gray) was cited by Greenman for his *B. tereticaulis* var. *sordida*. It is an uncertain form between *B. segetum* var. *patula*, which Dr. Scherzer collected at San José, and this species.

tripartita; Phila.); *idem* II. 1475, alt. 1,350 meters, eodem loco, November, 1906 (Brit.; Field); *idem* 7900, on rocks, alt. 350 meters, Cubilquitz, Dept. Alta Verapaz, Guatemala, January, 1901 (Berl.; Gray; Kew; Mo.; Mun.); *Wawra* 545, Vera Cruz, Mexico (forma *B. reptanti* var. *Urbanii* valde adpropinquans; Berl.; Mus. V.); *idem* 669, eodem loco (Berl.; Mus. V.); *A. Weberbauer* 840, alt. 2,400 meters, between Sandía and Cuyocuyo, Peru, April 27, 1902 (Berl.); *idem* 6583, 1,900–2,000 meters, Mantaro River at Huachicna, Prov. Huancayo, Peru, April 6, 1913 (Berl., 2 sheets); *C. Werckle* 63, Costa Rica (Berl.); *R. S. Williams* 160, alt. 1,440 meters, Apolo, Bolivia, April 15, 1902 (Brit.; Field).

DeCandolle, in describing his *Bidens tereticaulis* (loc. cit.), stated that it differed from *B. squarrosa* in having glabrate leaves, all of which were trisected, in having heads smaller, and in coming from a different region ("Differt . . . . a *B. squarrosa* foliis glabriusculis . . . capitulo minore, foliis etiam superis trisectis et patriâ"). But he had not seen the type material of *B. squarrosa*, as is evidenced by his failure to use the abbreviation "v.s." in connection with its description (op. cit. 599). At Paris is still preserved Kunth's type of *B. squarrosa*. Upon the label are the words "*Bidens squarrosa* mihi . . . Caracas." This is positively the specimen which Kunth had at hand in drawing up his description. In a former paper (Bot. Gaz. 64: 36, *pl. 9*. 1917) I have discussed the plant and presented a plate drawn directly from it, with an attempt at the utmost fidelity to all details. It consists of a branchlet coming from a portion of a stem. The leaves of the branchlet are simple, as described by Kunth. One well preserved leaf, still attached,[1] and certain similar but more fragmentary leaves, some of them broken loose, remain with the stem proper. These leaves are very important, as they establish definitely and beyond all question the identity of *B. squarrosa* with pubescent forms of *B. tereticaulis* DC., and not with *B. reptans* (L.) G. Don (with which it is equated by O. E. Schulz, op. cit. 140).

The presence of pubescence in this species is not of specific importance, a fact recognized by Greenman (loc. cit.) and by Schulz (op. cit. 142) when they treated very tomentose specimens as mere varieties of *B. tereticaulis*. Nor is the presence of several or even

[1] At least when I examined it in 1914, as may be seen from a photograph taken by myself at that time and now deposited, with many hundreds of others of the genus *Bidens*, in the herbarium of Field Museum. The specimen was very brittle and certain parts were observed to crack even during my cautious handling of it.

many undivided leaves of decisive value, a fact recognized by Robinson (loc. cit.) in treating as merely a variety of *B. tereticaulis* a specimen with all its leaves simple. That Coulter (loc. cit.) treated his *B. antiguensis* (cf. Sherff, op. cit., *pl. 10*) as a distinct species is easily explained by the fact that the strong superficial resemblance of his first type specimen's foliage to that of certain hispid forms of *B. pilosa* var. *radiata* (*B. leucantha* [L.] Willd.) led him to contrast it with that plant, from which he very properly regarded it as distinct. It is interesting to observe that Coulter also noted the remarkable variation in pubescence ("exceedingly variable in pubescence, from glabrous to pilose-pubescent").

The plant described by Coulter has the achenial awns glabrous. This character, which, however, is inconstant in some cases, is noticeable in nearly all the specimens of *B. squarrosa* from Central America (in South America and Mexico the awns are almost always barbed). The tendency to have smooth awns is apparently the only means by which a separation of the Central American forms from the species proper might be undertaken.[1] In view of the wide range of variation in leaves, flowering heads, and inflorescence, it seems unwise at the present time to select one or two forms (e.g., vars. *antiguensis* and *sordida*) and recognize for them a varietal rank.

Bidens Coreopsidis DC. var. *procumbens* Donn. Sm. is a form of this species. Its leaves are mainly 5-parted and the leaflets are slightly narrower than in most specimens. It approaches rather closely *B. reptans* (L.) G. Don var. *bipartita* O. E. Schulz, described from Puerto Rico. In fact, an occasional specimen from Central America or Mexico simulates so strongly the Puerto Rico material that the two practically pass into each other, making distinctions difficult except upon a purely geographic basis. Yet the general aspect of *Bidens reptans* (the species proper) is usually so distinct that botanists almost uniformly have retained *B. squarrosa* (*B. tereticaulis*) as of separate specific rank.

With the usually very distinct *B. segetum* and its var. *patula* of South America, *B. squarrosa* is connected by three specimens from Costa Rica and apparently by a few doubtful forms from South America. One Costa Rica plant, *Scherzer* 853, alt. 2,730 meters, San José, September–November (Mus. V.) is closer to *B. segetum*

[1] Like *B. reptans* and other members of the Section *Greenmania*, *B. squarrosa* often has different parts of one plant growing under widely diverse conditions of light and atmosphere because of the climbing habit and the great length of the stems and branches. Thus two specimens of strikingly different aspect may be gathered from the same plant.

BIDENS SIMPLICIFOLIA C. H. Wright

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(var. *patula*) in technical characters. The *somewhat* similar type of *B. tereticaulis* var. *sordida* Greenman, also collected in Costa Rica, appears closer, however, to *B. squarrosa*, to which it apparently must be referred. *Tonduz* 12284, a supplementary specimen cited by Greenman for his *B. tereticaulis* var. *sordida*, is a more uncertain form, apparently almost as justly referable to *B. segetum* as to *B. squarrosa*. Just what the exact significance of these more or less intermediate forms is, I am unable to judge satisfactorily. In any case it seems entirely without warrant to merge the two species into one.

Coreopsis trifoliata Bertoloni is represented, according to Dr. S. F. Blake (in lit., January 5, 1926; cf. Bull. Torr. Bot. Club 53: 217. 1926), by merely a small fragment about 1 dm. long (Hb. Bertol. now in Bol.). It was collected by Velásquez, Vulcano d'Acqua (Volcán de Agua). Dr. Blake concludes from his own careful study of the type fragment that it is a form of *B. squarrosa*.

EXPLANATION OF PLATE XLIV

Bidens squarrosa: a, fruiting branch, ×0.57; *b*, *c*, portions of branches drawn to show pubescence, ×0.57; *d*, *e*, exterior involucral bracts, × 3.45; *f*, *g*, interior involucral bracts, ×3.45; *h*, *i*, ray corollas, ×3.45; *j*, palea, ×3.45; *k*, *l*, disc florets, ×3.45; *m*, anthers, ×28.75; *n*, pollen grain, ×805; *o*, upper portion of pistil, ×17.25; *p*, achene, ×4.31; all from *J. D. Smith* 2354 (two type sheets of *Bidens antiguensis* Coult.), in Hb. Field.

EXPLANATION OF PLATE XLV, FIGS. *a–g*

Bidens squarrosa: a, flowering branch, ×0.73; *b*, exterior involucral bract, ×3.66; *c*, interior involucral bract, ×3.66; *d*, ray corolla, ×2.92; *e*, palea, ×3.66; *f*, disc floret, ×2.92; *g*, achene, ×2.92; all from *Berlandier* 2150 (cotype of *Bidens tereticaulis* DC.), in Hb. Gray, except *d* and radiate heads of *a*, which are amplified according to better preserved heads of *Pringle* 3373, in Hb. Field.

66. **Bidens Rubifolia** H.B.K. Nov. Gen. et Sp. 186 (237), *pl. 381*. 1820. Pl. XLVI.

Bidens floribunda H.B.K. op. cit. 187 (238).

Kerneria Rubifolia (H.B.K.) Cass. Dict. Sci. Nat. 24: 399. 1822.

Bidens rugulosa Turcz. Bull. Soc. Nat. Mosc. 24: (I) 184. 1851.

Bidens Rubifolia var. *floribunda* (H.B.K.) O. E. Schulz in Urban, Symb. Antill. 7: 142. 1911.

Perennis, scandens, ± 4 m. alta; caule fruticoso; ramis tetragonis vel subteretibus, glabris. Folia tenuiter petiolata, petiolis 1–5

cm. longis, petiolo adjecto 4–16 cm. longa, pinnatim 3–5-partita vel summa indivisa; foliolis subcoriaceis et saepe rugosis vel raro membranaceis, serratis, plerumque glabris, margine interdum revolutis, supra nitidis et satiate viridibus, subtus pallidioribus; lateralibus subsessilibus, ovatis vel ovato-lanceolatis, acutis vel obtusis, 1.5–6 cm. longis; intermedio petiolulato, ovato-oblongo vel lanceolato, apice anguste acuminato vel etiam obtuso, 4–12 cm. longo, plerumque 8–14 dentibus in unico latere. Capitula corymbosa, radiata, pedunculata pedunculis 1–4 (vel interdum etiam 12) cm. longis. Involucrum basi plerumque hispidum; bracteis exterioribus circ. 8–10, linearibus, nunc hispido-ciliatis et in tergo hispidis, nunc fere omnino glabris, 3–6 mm. longis, plerumque patentibus vel reflexis, quam interioribus nunc vix longioribus nunc dimidio brevioribus. Flores ligulati saepius 5, flavi, ligula oblongi, obsolete tridentati, 1.2–1.6 cm. longi. Achaenia paleas multo superantia, linearia, plana vel obcompresso-quadrangularia, paucisulcata, scabriuscula, marginibus hispida, fusco-nigra vel nigrescentia, corpore 0.9–2.1 cm. longa, interiora superne attenuata, biaristata vel rarissime subtriaristata, aristis erectis vel patentibus vel reflexis, retrorsum hamosis, 3.5–5.5 mm. longis.

Type specimen: Collected by *Alexander Humboldt* and *Aimé Bonpland* at Quito, Ecuador, 1799–1803[1] (Par.).

Distribution: In the region of the Andes, Venezuela to Peru.

Specimens examined: *Bro. Ariste-Joseph*, Páramo de Usme, Colombia, 1922 (U.S.); *Miguel Bang* 2031, Bolivia (Kew; N.Y.; forma); *Justin Goudot*, Bogotá, Colombia (Del.); *idem*, eodem loco, November, 1844 (Par.; Webb); *I. F. Holton* 265, eodem loco, October 28, 1852 (Boiss.; Del.; Kew; N.Y.); *Humboldt & Bonpland*, Quito, Ecuador (Par., type and duplicate, 2 sheets); *iidem*, alt. 2,700 meters, at foot of Mt. Javirac near Quito, February (Par.; type of *Bidens floribunda* H.B.K., the simple-leaved state); *Jameson* 497, near Pasto, Colombia (type material of *Bidens rugulosa* Turcz.; Boiss.; Brit.; Del.; Petrop.; Webb); *H. Karsten*, Bogotá, Colombia (Mus. V.); *idem*, Chiquinquira near Bogotá, Colombia (Mus. V., sub nom. *Bidente spirali* Schz. Bip.); *E. P. Killip & Bro. Ariste-Joseph* 11922, alt. 3,700 meters, Páramo de Choachi, near Bogotá, Colombia, August 8, 1922 (U.S.); *E. P. Killip & A. C. Smith* 17204, alt. 3,000–3,600 meters, in woods, western slope of Páramo Rico, Dept. Santander, Colombia, January 15–19, 1927 (U.S.; planta juvenili);

[1] The type sheet bears no citation of locality but the Bonpland duplicate at Paris gives Quito. This had not been seen by Kunth, hence his query, "*Crescit in Regno Quitensi?*"

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iidem 18779, alt. about 3,200 meters, dense forest, Quebrada de País, north of La Baja, Dept. Santander, January 31, 1927 (U.S.); *W. Lechler* 2127, Tabina, Peru (Kew); *F. C. Lehmann* 4703, alt. 2,800–3,000 meters, west slopes near Páramo of Guanacas, Prov. Popayán, Colombia, March (Berl.; Kew; Petrop.); *idem* 5965, alt. 2,500–2,800 meters, in dense forests on the Alto de Pesares above Popayán, Colombia, March (Berl.; Kew); *J. J. Linden* 487 p.p., alt. 1,200–4,350 meters, high Andes, Truxillo and Mérida, Venezuela, 1842 (Del.; per hanc formam magna anomalaque specimina num. 53 Mandonii—q.v.—*Bidenti Rubifoliae* conjuncta sunt); *idem* (similiter) 487, Caracas, Venezuela, April, etc., 1842 (Boiss.; Brit.; Kew; Mus. V.); *J. F. Macbride* 3468, alt. about 2,550 meters, Cani, Peru, April 16–26, 1923 (Field); *G. Mandon* 53, alt. 3,000 meters, in woods (nemoribus), between Motoato and Alto de Soque, Bolivia, June 1, 1860 (Del.; Kew; Mus. V., etc.; vide *Lindenii* 487 ex Mérida, etc.); *Mutis* 26, Colombia (Linn.); *F. W. Pennell* 8858, alt. 2,100–2,500 meters, edge of forest above Salento, Dept. Caldas, Colombia, July 25–31, 1922 (U.S.); *H. Pittier* 1432, alt. 2,550 meters, below Pitaió, Río Palo Basin, Tierra Adentro, Dept. Cauca, Colombia, February, 1906 (Field; U.S.); *Rivet* 924 and 2220, Soja, equatorial South America, April, 1905 (Par.; atypica); (*L. Schlim* 255, formerly referred at Kew to this species, is seen, at least in some herbaria, to be *B. squarrosa;*) *A. Stübel* 101*a*, vicinity of Bogotá, Colombia, April–May, 1868 (Berl.); *J. J. Triana* 1367, alt. 2,700 meters, Colombia (Berl.; Par.); *idem* 1368, alt. 2,700 meters, Prov. Bogotá, Colombia, 1851–1857 (Brit.; Par.); *idem* 1369 p.p., Colombia (Berl.).

The foliage is at times 3-partite as in the type material, or again it is mostly 5-partite, as in my plate. The leaves are typically subcoriaceous and strongly rugose, characters failing to show in the plate, but in herbarium specimens usually very distinctive. The specimens cited by Turczaninow for his *Bidens rugulosa* (*Jameson* 497) are mutually rather dissimilar in foliage, varying from typical or nearly so to a form with lanceolate leaflets, these hardly rugose but more closely and finely serrate, a terminal leaflet having as many as 46 teeth on each side. Of the latter form an extreme, such as Turczaninow must have had for his description, is in Kew, on the same sheet with two other specimens more nearly typical for *B. Rubifolia.* It suggests *B. segetum* Mart. very strongly. In fact, J. G. Baker (in Mart. Fl. Bras. 6, pt. 3: 245. 1884), doubtless influenced by this material at Kew, synonymized the name *B. speciosa* Gardn. (=*B. segetum*) with *B. Rubifolia* H.B.K. We may note also that

some forms of *B. segetum* var. *patula* (Gardn.) Sherff approach in foliar rugosity very closely to *B. Rubifolia;* e.g., *Goudot* 1.

Seemann 686, from Ecuador, has foliage typical for *B. squarrosa* H.B.K., but in the characters of the inflorescence is like *B. Rubifolia* and *B. segetum*. *Lehmann* 4703 has the rugose leaves of *B. Rubifolia* but small flowering heads as in *B. squarrosa*. Through these and certain other specimens much confusion has arisen in literature, but it appears that the maintenance of *B. squarrosa* and *B. Rubifolia* as distinct species is more in harmony with the Linnean species concept.

EXPLANATION OF PLATE XLVI

Bidens Rubifolia: a, flowering and fruiting branch, ×0.58; *b*, tripartite leaf, ×0.58; *c*, exterior involucral bract, ×2.91; *d*, interior involucral bract, ×2.91; *e*, ray floret, ×2.91; *f*, palea, ×2.91; *g*, disc floret, ×2.91; *h*, achene, ×2.32; all from *Lehmann* 4703, in Hb. Kew.

67. **Bidens simplicifolia** C. H. Wright, Kew Bull. 1906: 5. 1906. Pl. XLVII.

Frutex scandens, 3 m. altus; ramis teretibus, striatis, glabris. Folia petiolata petiolis 1–4 cm. longis, petiolo adjecto 0.8–2 dm. longa et 4–7 cm. lata, indivisa; lamina nunc valde ovata nunc oblongo-ovata, apice acuminata basi primum rotundata deinde ad petiolum decurrente, margine (non alte) serrata atque eciliata, faciebus glaberrima. Capitula corymbosa, subtenuiter pedicellata pedicellis glabris usque ad 1 dm. longis, radiata, pansa ad anthesin ± 4 cm. lata et circ. 1.4–1.6 cm. alta. Involucri bracteae exteriores numerosae (plerumque 12–14) ac perspicuae, demum patentes vel subreflexae, spathulato-obovatae vel -oblanceolatae, tergo glabrae, margine sparsim ciliatae, saepius 3-nervatae, apice rotundatae vel obtusissimae, 6–9 mm. longae et 1.5–2.6 mm. latae; interiores lanceolato-oblongae, brunneae, anguste hyalino-marginatae, subtiles, apicaliter pubescentes, paulo longiores. Flores ligulati 6–8, flavi, ligula late oblongo-oblanceolati, apice subintegri, circ. 1.5–1.8 cm. longi. Paleae lineares, pro capitulo submaturo 1–1.4 cm. longae. Achaenia linearia lateribus plus minusve parallela, valde obcompressa, atra, utraque facie circ. 8-sulcata et glabra vel sub apice sparsim erecto-setosa, marginibus densissime suberecto-ciliata, corpore submatura 8–14 mm. longa et circ. 0.5–0.7 mm. lata, apice perspicue biaristata aristis tenuibus, stramineis, supra retrorsum hamosis basi saepe antrorsum hamosis, moderate patentibus, 5–6 mm. longis.

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Type specimen: Collected by *Heinrich Franz Alexander Eggers*, No. 15725, in dry, bushy places, Agua Amarga at El Recreo, Ecuador, April 10, 1897 (Kew).

Distribution: Known only from type locality in Ecuador.

Specimens examined: *Eggers* 15725 (type, Kew: cotypes, Berl.; Field; Mun.).

In 1915 (Bot. Gaz. 59: 309) this species was referred by me to *Bidens floribunda* H.B.K. Subsequent study of additional material has shown, however, that *B. floribunda* is merely a simple-leaved state of *B. Rubifolia* H.B.K., whereas *B. simplicifolia* is apparently distinct.

EXPLANATION OF PLATE XLVII

Bidens simplicifolia: a, flowering and fruiting branch, ×0.52; *b*, exterior involucral bract, ×1.56; *c*, interior involucral bract, ×2.1; *d*, ray corolla, ×3.1; *e*, palea, ×1.56; *f*, disc floret, ×2.5; *g*, anthers, ×8.2; *h*, upper portion of pistil, ×7.47; *i*, achene, ×2.08; chiefly from cotype in Hb. Field, but partly from cotype in Hb. Berl. and partly from type in Hb. Kew.

68. **Bidens Vincaefolia** Karst. & Schz. Bip. ex Sherff, Bot. Gaz. 59: 303. 1915. Pl. XLV, figs. *h–m*.

Herba perennis, verisimiliter volubilis; caule angulato vel tetragono, ramoso; ramis glabris vel subglabris, tetragonis, striatis. Folia petiolata petiolis ciliatis 1–1.8 cm. longis, petiolo adjecto 2–3.5 cm. longa, tripartita vel raro indivisa, subcoriacea vel membranacea, subtus pallidiora et ad venas minute pubescentia, marginibus integris vel rarius serratis et in specimine sicco subrevolutis; foliolo terminali lanceolato, 1–2 cm. longo; lateralibus oblanceolatis vel obovatis, 0.6–1.3 cm. longis. Capitula pedunculata, radiata, pansa ad anthesin circ. 1 cm. lata et 5–6 mm. alta. Involucrum basi hispidum, bracteis subaequalibus; exterioribus circ. 5, linearibus, plus minusve pubescentibus, nigro-striatis, 3–4 mm. longis; interioribus lanceolatis, subglabris. Flores ligulati circ. 6 vel 7, flavi, nonnullis lineis nigro-striati, ligula elliptico-oblanceolati, 5–8 mm. longi. Achaenia linearia, plana, atro-fusca, corpore circ. 1 cm. longa, biaristata aristis retrorsum hamosis, 1–2.5 mm. longis.

Type specimen: Collected by *Hermann Karsten* at Bogotá, Colombia (Par.).

Distribution: Known only from type locality of Bogotá, Colombia.

Specimens examined: *Karsten* (type, Par.: cotype, Mus. V.).

This species appears unique, being distinct in general aspect from any other species known to me. The type sheet, originally in Schultz Bipontinus' own herbarium, bears several small specimens. These are remarkably uniform and are allied most closely with *Bidens Rubifolia* H.B.K., the leaves of which are much less diminutive. While true *B. Rubifolia* grows at Bogotá (e.g., *I. F. Holton* 365, October 28, 1852), Karsten and Schultz Bipontinus evidently regarded the Karsten plant as specifically distinct. This course I also must adopt, as I am unable to connect the two forms in herbaria by any intermediate ones.

EXPLANATION OF PLATE XLV, FIGS. *h–m*

Bidens Vincaefolia: h, flowering and fruiting branch, ×0.73; *i*, exterior involucral bract, ×3.66; *j*, interior involucral bract, ×3.66; *k*, ray corolla, ×2.92; *l*, palea, ×3.66; *m*, disc floret, ×2.92; all from type.

69. **Bidens Gentryi** Sherff, Bot. Gaz. 97: 608. 1936.

Herba perennis, gracillima, circ. 1 m. alta; caulibus paucibus ex unica radice, parce rectis sed non certe volubilibus, subteretibus, sulculatis, glabris, tantum circ. 1–1.3 mm. crassis. Folia petiolata petiolis tenuibus glabris plerumque 1–3 cm. longis, petiolo adjecto principalia 1–1.3 dm. longa, bipinnata vel tripinnatisecta; foliolis lateralibus primariis (imis tenuiter petiolulatis) 2 vel 3 jugis, membranaceissimis, glabratis vel margine sparsim setuloso-ciliatis, segmentis plus minusve lineari-oblongis vel ovato-lanceolatis terminali anguste attenuato; folioli terminalis segmento terminali angustissime lineari-acuminato usque ad 5.5 cm. longo. Capitula corymbose disposita (3 vel 4 ad caulis finem), pedunculata pedunculo tenui glabro ± 7 cm. longo, radiata, pansa ad anthesin circ. 3.8–4.3 cm. lata et ± 1.2 cm. alta. Involucri bracteae exteriores circ. 8, patentes vel subreflexae, lineares, apice acutae, glabratae, circ. 9–12 mm. longae; interiores oblongo-lanceolatae, non nisi apice pubescentes, breviores. Flores ligulati 7–9, flavi, ligula elliptico-oblanceolati, apice saepe 2- vel 3-denticulati, ± 2 cm. longi. Paleae superne sensim angustatae, apice obtusae, sub 1 cm. longae. Achaenia submatura linearia, subtetragono-obcompressa, brunneo-atra; corpore glaberrimo vel apicem versus sparsissime erecto-setuloso, sub 1 cm. longo et sub 1 mm. crasso, omnibus (4) faciebus 2-sulculatis; aristis abortivis vel 2, tenuibus, sub 3 mm. longis, suberectis, retrorsum hamosis hamis paucis albidis acerrimis.

Type specimen: Collected by *Howard Scott Gentry*, No. 1700, growing a meter high, stalks several from the base, pine slope in

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Upper Sonoran region, Pinal, Sierra Charuco, State of Sonora, Mexico, September 9, 1935 (Field).

Distribution: Southern Sonora and western Chihuahua, Mexico.

Specimens examined: *Gentry* 1700 (type, Field); *idem* 2847, a colony on sunny slope, in transition, pine-oaks, San José de Pinal, Río Mayo, Chihuahua, September 22, 1936 (Field).

Apparently intermediate between *Bidens reptans* var. *Urbanii* and *B. urophylla*, although not known definitely as yet to have a climbing habit. From the former it differs in its larger capitula, longer exterior involucral bracts, eciliate achenes, etc. From the latter it can be told at once by its more compound leaves, larger and more numerous ligulate florets, etc.

70. **Bidens urophylla** Sherff, Bot. Gaz. 81: 32. 1926. Pl. XLVIII.

Herba glabra, verisimiliter perennis scandensque, forsitan 1–3 m. alta vel longa; ramis aegre angulatis vel teretibus. Folia petiolata petiolis tenuibus 2.5–4.5 cm. longis, petiolo adjecto 8–14 cm. longa, pinnatim 3–5-partita, foliolis anguste lanceolatis, membranaceis, usque ad 1.6 cm. latis, valde et perspicue (prominentibus anguste linearibus cauda 1–3.5 cm. longa) caudato-acuminatis, pauciserratis unico latere 2–6 mucronatis dentibus munito, margine eciliatis. Capitula radiata, pansa ad anthesin ± 3 cm. lata et 0.9–1.4 cm. alta, pro maxima parte verisimiliter corymboso-paniculata. Involucri bracteae exteriores 6–8, anguste lineares, subglabrae, crassiusculae, apice subacutae, 5–8 mm. longae; interiores latiores et paulo longiores. Flores ligulati 5 vel 6, sicci albo-flavidi, ligula oblongo-elliptici, apice denticulati, ± 1.5 cm. longi. Achaenia matura non visa; submatura fusco-nigra, linearia, plana vel subtetragona, corpore 9–12 mm. longa et circ. 1 mm. lata, omnino etiam ad margines glabra vel ad summam sparsissime setulosa, biaristata aristis supra retrorsum infra antrorsum hamosis, tantum circ. 1 mm. longis.

Type specimen: Collected by *Karl Friedrich Philipp Von Martius*, in thickets ("sepibus") at the margins of forests near Mariana, State of Minas Geraes, Brazil, April, 1817–1820 (Mun.).

Distribution: Known only from vicinity of Mariana, State of Minas Geraes, Brazil.

Specimens examined: *Martius*, near Mariana (type, Mun.).

The type had been labeled *Bidens Rubifolia* H.B.K., probably by J. G. Baker. Indeed, from its general habit, the species does appear to be without doubt a close relative of such species as *B. Rubifolia*

H.B.K., *B. squarrosa* H.B.K., *B. segetum* Mart., *B. reptans* (L.) G. Don, *B. Holwayi* Sherff, and *B. Shrevei* Britt., all of them perennial climbers. From these it differs decidedly in its remarkably caudate-tipped leaflets and in its achenes, which are almost entirely glabrous, even on the margins, and have only short aristae.

EXPLANATION OF PLATE XLVIII

Bidens urophylla: a, flowering and fruiting specimen, ×0.62; *b*, exterior involucral bract, ×4.94; *c*, interior involucral bract, × 4.94; *d*, ray corolla, ×4.94; *e*, palea, ×4.94; *f*, disc floret, ×4.94; *g*, achene, ×4.94; all from type.

71. **Bidens segetum** Mart. ex Colla, Herb. Pedem. 3: 307. 1834. Pl. XLIX and Pl. L.

Coreopsis brasiliensis Colla, Herb. Pedem. 3: 479. 1834.

Bidens speciosa Gardn. in Hook. Lond. Journ. Bot. 4: 126. 1845.

Bidens multiserrata Schz. Bip. Linnaea 30: 181. 1859–1860.

Bidens silvatica Schz. Bip. ex Baker in Mart. Fl. Brazil. 6, pt. 3: 245. 1884.

Bidens Rubifolia H.B.K. var. *silvatica* Baker, loc. cit.

Bidens pallida Rusby, Bull. N. Y. Bot. Gard. 4: 389. 1907; cf. Sherff, Bot. Gaz. 81: 53 and *pl. 4*. 1926.

Bidens speciosa var. *silvatica* (Schz. Bip. ex Baker) O. E. Schulz in Urban, Symb. Antill. 7: 142. 1911.

Folia omnia simplicia ovato-lanceolata usque ad 5.5 cm. lata. var. *β. patula.*

Folia plerumque 3- vel etiam 5-partita; raro simplicia laminis moderate angusteve lanceolatis . . . . . *B. segetum* sensu stricto.

Perennis, scandens, ± 9 m. alta (vel longa); caule fruticoso, tereti; ramulis plus minusve teretibus, glabris vel pubescenti-tomentosis. Folia petiolata petiolis tenuibus 1.5–4.5 cm. longis, petiolo adjecto 0.6–1.5 cm. longa, plerumque tripartita sed interdum multa indivisa (var. *silvatica* [Schz. Bip. ex Bak.] O. E. Schulz) vel raro pauca 5-partita; foliolis anguste lanceolatis vel raro ovato-lanceolatis, acuminatis, minute et acute serratis, crassiusculis vel submembranaceis, supra glabriusculis vel hispidulis, subtus plus minusve pubescentibus vel etiam glaberrimis, lateralibus sessilibus et basi valde inaequilateralibus vel (pro foliis 5-partitis) infimis petiolulatis et basi aequilateralibus, terminali petiolulato, plerumque 20–45 dentibus in unico latere serrulato, circ. 1.2–2.5 vel rariter usque ad 3.3 cm. lato. Capitula

BIDENS SEGETUM var. PATULA (Gardn.) Sherff

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paniculata, radiata, pansa ad anthesin 3–5 cm. lata et 9–12 mm. alta, pedunculata pedunculis 1–5 cm. longis. Involucrum hispidum; bracteis exterioribus circ. 8, late lineari-spathulatis, ciliatis, apice acutis vel subacutis, reflexo-squarrosis, 5–7 mm. longis, plerumque quam interioribus lanceolatis paulo brevioribus. Flores ligulati 5 vel interdum 6, flavi, ligula elliptico-oblanceolati, apice acuti vel subacuti, ±1.5 cm. longi. Achaenia linearia, plana vel obcompresso-tetragona, atra, marginibus apiceque valde hispida pilis longis plerumque 2–4-adgregatis et saepe tuberculo minuto insidentibus, corpore 8–13 mm. longa, demum paleas multo superantia, biaristata; aristis tenuibus, supra retrorsum hamosis sed basim versus antrorsum hamosis, 3.5–5 mm. longis, plerumque patentissimis.

Type specimen: Collected by *Karl Friedrich Philipp Von Martius*, in Brazil, communic. anno 1827 (Tur.).

Distribution: Peru (where very rare) and Bolivia eastward to states of Goyaz, Minas Geraes, and Paraná, Brazil; recently collected (*Solís* 460) in Costa Rica.

Specimens examined: *Miguel Bang* 2152 pro parte, Coripati, Yungas, Bolivia, April 25, 1894 (type of *Bidens pallida* Rusby, N.Y.: cotypes, Boiss.; Brit.; Cop.; Del.; Gray; Kew; Mo.; N.Y.; Phila., etc.); *P. Claussen*, Minas Geraes, Brazil (Del., 5 sheets; Kew; Mus. V., 3 sheets; N.Y., forma foliis indivisis; Par., 8 sheets); *idem* 8, in shade, Cachoeira (Caxoeira) do Campo, Minas Geraes, Brazil, April, 1839 (Del.); *idem* (similiter) 8, Minas Geraes, Brazil, 1841 (Par.); *idem* 105, eodem loco, 1840 (Berl.; Boiss.; forma foliis indivisis); *P. Dusén* 4123, along stream in woods, Lago, Paraná, Brazil, March–July, 1904 (Brit.; U.V.); *idem* 9817, margins of small forests, Porta Grossa, Paraná, Brazil, March 31, 1910 (U.S.); *idem* 16866, alt. 740 meters, edge of forest, Jaguariahyva, Brazil, March 24, 1915 (Berl., 2 sheets; Mo.; U.S.); *George Gardner* 509, Organ Mts., Brazil (Kew; forma subtomentosa); *idem* 510, Serra dos Orgãos, State of Rio de Janeiro, Brazil, February, 1837 (a Gardnero loc. cit. pro var. tomentosa sed non nominata habita: Berl.; Brit., 3 sheets; Del.; Flor.; Kew; Mus. V.; N.Y.; Par.); *idem* 511, in forests, alt. about 900 meters, eodem loco, February–May, 1837–1838 (type collection of *Bidens speciosa* Gardn.; Berl.; Brit., 2 sheets; Del.); *A. Glaziou* 2624, Petropolis, State of Rio de Janeiro, March 24, 1879 (Cop.; Par.); *idem* 12881, road from the Iron Mine, vicinity of Rio de Janeiro, April 24, 1881 (Berl.; Cop.; Kew; Par., 2 sheets; Petrop.); *T. H. Gomer* 1743, April 2, 1918 (Field); *S. E. Henschen* 193, Caldas, Minas Geraes, Brazil, April, 1868 (U.S.); *F. C. Hoehne* 2690, Pocos de

Caldas, Minas Geraes, January 9, 1919 (Field); *E. W. D. & Mary M. Holway* 1407, Juiz de Fora, Minas Geraes, December 17, 1921 (U.S.); *iidem* 1713, alt. 1,100 meters, stem to 1 inch in diameter, climbing over trees to 30 feet and then hanging down, Pocos de Caldas, State of São Paulo (U.S.); *Langsdorff*, Minas Geraes, Brazil (Kew); *Lund & Warming* 603, Lagoa Santa, Minas Geraes (Cop.); *Martius*, grassy stream banks above Serra do Mar (near Santos), São Paulo, Brazil, December (Mun.); *idem*, Brazil, 1827 (Kew); *idem*, Brazil, communic. 1827 (type, Tur.); *idem* 823, Brazil (Berl.; Del.; Kew; Mun., 2 sheets; Mus. V.; N.Y.; Par.); *idem* 1018, thickets and shady forests, Mainarde, Minas Geraes, Brazil, April (Mun.); *Mendonça* 1120, Tacarchy, State of São Paulo, Brazil, April, 1888 (Berl.); *idem* 1254, Brazil (Berl.); *Pohl* 1624, Brazil (Mus. V.); *A. Raimondi* 7198, Chorillos, Prov. Contumazá, Dept. Cajamarca, Peru, 1875 (Berl.); *A. F. Regnell* I–193, Caldas, Minas Geraes (Par., sub nom. *Bidens multiserrata* Schz. Bip.); *idem* (similiter) I–193, eodem loco, April, 1865 (Cop., 2 sheets); *idem* (similiter) I–193, eodem loco, April 15, 1867 (Berl.); *Ludwig Riedel* 138*x*, mountain forests, Serra dos Orgãos, State of Rio de Janeiro, Brazil, April, 1823 (type collection, *Bidens silvatica* Schz. Bip.; Gray; Kew; Par.; Petrop.); *idem* 2122, shady forested places, Itu, State of São Paulo, Brazil, March, 1834 (Petrop., 4 sheets); *Riedel & Langsdorff* 206, Brazil (Petrop.); *A. Russell* 218, State of São Paulo, December 15, 1897 (Field); *H. Schenck* 3398, Queluz, Minas Geraes, March 31, 1887 (Berl.); *idem* 3481, Congonhas do Campo, Minas Geraes, April 3, 1887 (Berl.); *Schüch* 1824, Brazil (Mus. V.); *W. Schwacke* 9317, Ouro Preto, Minas Geraes, April, 1893 (Berl.); *Seemann* 686, Loja, Ecuador, August (Kew); *Sello* 590, Brazil (Berl.); *idem* 1104, Brazil, 1819 (Berl., 2 sheets); *idem* 4548, Brazil (Berl.); *idem* 5670, Brazil (Berl.); *L. B. Smith* 2301, vicinity of Monte Serrat, Mt. Itatiaya, State of Rio de Janeiro, Brazil, April 11, 1929 (Gray); *F. Solís R.* 460, alt. 1520 meters, forest margins, Hacienda Montecristo, Costa Rica, November 20, 1936 (Field); *José Steinbach* 5584, alt. 400 meters, orilla del bosque, Río Surutú, Buena Vista, Prov. Sara, Dept. Santa Cruz, Bolivia, April 15, 1921 (Del.; Field); *A. de St. Hilaire*, Minas Geraes, 1816–1821 (Par.); *idem* 1190, eodem loco (Par., 3 sheets; forma tomentosa); *idem* 1199, State of São Paulo, Brazil, 1816–1821 (Par., 4 sheets); *E. Ule* 2585, Brazil, April, 1892 (Hamb.); *idem* 3403, Brazil, April, 1894 (Hamb.); *Eugene Warming*, Lagoa Santa, Minas Geraes, May 7, 1864 (Cop.; Gray; Par.); *A. Weddell* 2656, Goyaz, April, 1844 (Par.); *Widgren*,

BIDENS SHREVEI Britt.

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Minas Geraes, 1845 (Cop.; Mun.; U.S.); *idem* 251, Caldas, Minas Geraes, March 27, 1846 (Berl.; Cop., 2 sheets; Flor.; Kew; Mun.; Par.; Petrop.; U.V.); *idem* 252, Minas Geraes, 1845 (Berl.).

Varies widely in pubescence, leaf division, and leaf outline. The type material has leaves glabrate above. *Gardner* 510, by Gardner regarded as a variety (var. *tomentosa* in herb.) has smaller leaves and is tomentose. These extremes are connected, however, by various intermediate forms (e.g., *Warming*, Hb. N.Y.). The var. *silvatica* is merely a foliage state supposedly having undivided leaves. The Riedel specimen at Kew has one branch with all simple leaves and another branch, from the same stem, with all leaves simple except two lower ones. One of these has an additional lateral leaflet and the other has two lateral leaflets, being tripartite as in the species proper.

Bidens multiserrata Schz. Bip. was a name given to Regnell's Ser. I, No. 193 (pro parte), collected at Caldas in the State of Minas Geraes. The type material from Schultz Bipontinus' herbarium (Par.) is clearly *Bidens segetum* Mart.

Bidens segetum var. *β.* **patula** (Gardn.) comb. nov.
Pl. LI.

Bidens speciosa var. *patula* (Gardn.) O. E. Schulz in Urban, Symb. Antill. 7: 142. 1911.

Bidens patula Gardn. in Hook. Lond. Journ. Bot. 7: 405. 1848.

Bidens longipetiolata Rusby, Bull. N. Y. Bot. Gard. 8: 131. 1912.

Folia omnia simplicia, ovato-lanceolata, usque ad 5.5 cm. lata.

Type specimen: Collected by *George Gardner*, No. 4254, bushy banks of the Rio San Bernardo, near San Bernardo, Goyaz, Brazil, May, 1840 (Kew).

Distribution: Colombia, where approaching *Bidens Rubifolia* H.B.K., to State of Goyaz in Brazil, and to Bolivia and Peru. Represented (somewhat doubtfully) in Costa Rica by very scanty material.[1]

Specimens examined: *Miguel Bang* 2152 pro parte, Coripati, Yungas, Bolivia, April 25, 1894 (Carn.; foliis simplicibus, lanceolato-ovatis, petiolis 1.5–2 cm. longis); *Gardner* 4254 (type, Kew: cotypes, Berl.; Del., 2 sheets; Flor.; Kew, 3 sheets; N.Y.); *Const. de Jelski* 628, 749, 750, and 751, Callacate, Peru, May, 1879 (Berl.); *E. P. Killip & A. C. Smith* 20871, alt. 1,000–1,300 meters,

[1] Regarding its presence in Costa Rica, see under *B. squarrosa* H.B.K.

between Chinacota and La Esmeralda, Dept. Norte de Santander, Colombia, March 19, 1927 (U.S.); *Lund* 644, loco ignoto, December 31, 1863 (Cop.);[1] *A. Raimondi* 3906, Callacate, Dept. Cajamarca, Peru, May, 1879 (Berl.); *A. Weberbauer* 3857, alt. 2,000–2,400 meters, below San Pablo, Prov. and Dept. Cajamarca, Peru, April 29, 1904 (Berl.); *R. S. Williams* 194, alt. 1,140 meters, Michariapo, Bolivia, April 9, 1902 (*B. longipetiolata* Rusby, type, N.Y.: cotype, Brit.).

The var. *patula* would seem at first from a study of merely the type specimens (*Gardner* 4254) to be specifically distinct, as thought by Gardner. But an examination of technical characters in various herbaria convinces me of the soundness of O. E. Schulz's policy in treating it as merely a variety of *B. segetum*. In fact, with the accumulation of more herbarium specimens in the future, even the varietal distinctions will perhaps be found so fluctuating that maintenance of the var. *patula* will be considered inadvisable. In this connection may be noted the specimens of *Miguel Bang* 2152. Most of these are referable to *B. segetum* proper, but the one at the Carnegie Museum has the leaves all simple, lance-ovate, and the petioles 1.5–2 cm. long, thus placing it with the var. *patula*.

The leaves vary in petiolar length, and it appears that *B. longipetiolata* Rusby, a species described from specimens lacking mature achenes, is merely a form of var. *patula* with especially long petioles (up to 4.5 cm.). Through the var. *patula*, *B. segetum* doubtless passes into the related species, *B. squarrosa* H.B.K. (cf. p. 186 and p. 184, footnote 1). Through the Goudot specimens, it approaches *Bidens Rubifolia* H.B.K.

EXPLANATION OF PLATE XLIX

Bidens segetum: a, flowering branch, ×0.57; *b*, portion of leaflet, lower surface, showing characteristic venation, ×0.57; *c*, exterior involucral bract, ×2.28; *d*, interiot involucral bract, ×2.28; *e*, ray floret, ×2.28; *f*, palea, ×2.28; *g*, disc floret, ×2.28; *h*, portion of mature achene, ×2.86; *a–g*, from *Gardner* 511, mainly in Hb. N.Y.; *h*, from *P. Claussen*, Minas Geraes, Brazil, in Hb. Mus. V.

EXPLANATION OF PLATE L

Bidens segetum: a, flowering branch, ×0.61; *b*, exterior involucral bract, ×3.05; *c*, interior involucral bract, ×3.05; *d*, ray corolla,

[1] Here may be mentioned the interesting plant, *Scherzer* 853, referred to under *B. squarrosa* as coming from Costa Rica (alt. 2,730 meters, San José; Mus. V.), which appears closer to *B. segetum* (var. *patula*) than to *B. squarrosa*.

×2.44; *e*, palea, ×3.05; *f*, disc floret, ×3.05; all from *Miguel Bang* 2152 pro parte (type and various cotypes of *Bidens pallida* Rusby).

EXPLANATION OF PLATE LI

Bidens segetum var. *patula: a*, fruiting specimen, ×0.68; *b*, one of larger cauline leaves, ×0.68; *c*, *k*, portions of leaf, lower surface, showing pubescence, ×3.4; *d*, *l*, exterior involucral bracts, ×4.08; *e*, *m*, interior involucral bracts, ×4.08; *f*, ray corolla, ×4.08; *g*, *n*, paleae, ×4.08; *h*, *o*, disc florets, ×4.08; *i*, achene, ×4.08; *j*, flowering branch, ×0.68; *a–i*, from cotype, in Hb. Gray; *j–o*, from *Williams* 194 (type of *Bidens longipetiolata* Rusby), in Hb. N.Y.

72. **Bidens Shrevei** Britton, Bull. Torr. Bot. Club 37: 359. 1910. Pl. LII.

Herba perennis, fruticosa, scandens, glabra; caule tetragono, saepe etiam 5–6.5 m. longo, ramoso; ramis tenuibus, acriter tetragonis, conspicue subnigro-striatis, 3–6 dm. longis. Folia tenuiter petiolata petiolis 1.5–3.5 cm. longis, petiolo adjecto 5–11 cm. longa, saepe recurvata, simplicia, ovata vel oblongo-lanceolata, apice acuminata vel tantum subacuta et basi plerumque subtruncata, serrata, non ciliata, membranacea, sicca subbrunneo-viridia venis brunneis. Capitula non numerosa, radiata, pansa ad anthesin 3–5 cm. lata et 1.2–1.5 cm. alta, pedunculata pedunculis saepius nudis, 2–6 cm. longis. Involucri basis parce hispida; bracteis exterioribus 7–9, late linearibus vel lineari-spathulatis, fere foliaceis, apice acutis pubescentibusque, margine paucis pilis raro ciliatis, 6–9 mm. longis, squarroso-reflexis plerumque fere a primo, interioribus subaequalibus. Flores ligulati 6–8, flavidi, ligula elliptici, apice obtusiusculi, 1.5–2 cm. longi. Achaenia linearia, obcompresso-tetragona, ad latera et saepe ad costas medias pilis saepe 2–4-adgregatis et plerumque tuberculo insidentibus erecto-patentibus obsita, nigrescentia, corpore 1–2.2 cm. longa, interiora demum paleis multo longiora, biaristata; aristis tenuibus, brunneo-flavidis, fere ad basim retrorsum hamosis, divaricatis, 4–5 mm. longis, hamis raro caducis.

Type specimen: Collected by *Forrest Shreve* on banks at higher altitudes in the Blue Mountains, Cinchona, Jamaica, November, 1905 (N.Y.).

Distribution: Jamaica, also in Colombia.

Specimens examined: *N. L. Britton & A. Hollick* 1792, rocky bank below Hardware Gap, vicinity of New Castle, Jamaica, March 1, 1908 (N.Y.); *W. Fawcett* 8221*a*, near Cinchona, Jamaica, Novem-

ber 27, 1905 (Field; Kew); *W. Harris* 6735, alt. 1,515 meters, St. Catherine's Peak, Jamaica, 1896 (Brit.); *A. S. Hitchcock*, Blue Mountain Peak, Jamaica, December 12, 1890 (Mo.); *D. Morris*, alt. up to 1,800 meters, Jamaica, February, 1884 (Kew); *C. R. Orcutt* 7054, Arntully, Jamaica, November 22, 1928 (Stanf.); *H. H. Rusby & F. W. Pennell* 647, alt. 2,000–2,500 meters, Cordillera Oriental, east of Neiva, Dept. Huila, Colombia, August 1–8, 1917 (Field; Mo.; N.Y.; U.S.); *Roger Shakespear*, Jamaica, 1777 (Brit.); *Shreve*, Cinchona, Jamaica, November, 1905 (type, N.Y.).

EXPLANATION OF PLATE LII

Bidens Shrevei: a, flowering branch, ×0.6; *b*, a leaf with oblong shape, ×0.6; *c*, exterior involucral bract, ×3; *d*, interior involucral bract, ×3; *e*, ray corolla, ×3; *f*, palea, ×3; *g*, disc floret, ×3; *h*, anthers, ×15; *i*, pollen grain, ×700; *j*, upper portion of pistil, ×15; *k*, achene, ×3; *b*, from Fawcett 8221*a*, in Hb. Field; rest from type.

73. **Bidens Holwayi** Blake & Sherff ex Sherff, Bot. Gaz. 64: 39. 1917. Pl. LIII.

Herba scandens; caule demum 20–30 m. longo, adscendente (ex Holwayo) in altitudinem 12–15 m.; ramis tetragonis, glabris, striatis. Folia petiolata petiolis 1.5–4 cm. longis basi connatis et hispido-ciliatis, petiolo adjecto 6–18 cm. longa, tripartita vel summa indivisa, ciliata, supra non manifeste hispida (nisi ad venas), infra plus minusve piloso-hispida, serrata; foliolis lateralibus ovatis vel ovato-lanceolatis, terminali ovato-lanceolato vel lanceolato. Capitula magna, radiata, pansa ad anthesin circ. 6 cm. lata, pedunculata pedunculis (in unico specimine observato) 12–13 cm. longis. Involucrum ad basim dense piloso-tomentosum, bracteis exterioribus 8 vel 9, late linearibus, hispido-ciliatis, subsparsim hispidis, 9–15 mm. longis; interioribus saepe paulo brevioribus, anguste lanceolatis, ad faciem exteriorem piloso-tomentosis, marginibus diaphanis. Flores ligulati 5 vel interdum verisimiliter etiam 6 vel 7, ligula linearielliptici, flavi, 9–11-striati, 2.3–3 cm. longi, ad apicem irregulariter 2–4-lobulati. Achaenia linearia, subplana, atra, setis albidis suberectis ciliata, ad facies (praecipue ad costas medianas) sparsim hispida, corpore ± 1.3 cm. longa, ad apicem nonnullis erectis setis coronata, biaristata; aristis 4–7 mm. longis, divaricatibus et retrorsum hamosis hamis tenuibus.

Type specimen: Collected by *Edward W. D. Holway*, No. 816, Quezaltenango, Guatemala, January 31, 1917 (Gray).

Distribution: Known only from type locality of Quezaltenango, southwestern Guatemala.

Specimens examined: *Holway* 816 (type, Gray).

A strange species of uncertain status. The leaves are not unlike those sometimes found on *Bidens squarrosa*. The tetragonal branches, the large heads (in anthesis about 6 cm. across), their very large involucral bracts, all stamp the species as being distinct from *B. squarrosa*. Apparently *B. Rubifolia* and *B. segetum* var. *patula* are much more closely related to *B. Holwayi*. Possibly one of them, particularly *B. segetum* var. *patula*, may some day be shown, by means of various connecting or intermediate forms, to be conspecific with it.

EXPLANATION OF PLATE LIII

Bidens Holwayi: a, branch in subfruiting stage, ×0.56; *b*, exterior involucral bract, ×2.8; *c*, interior involucral bract, ×2.8; *d*, ray corolla, ×2.8; *e*, palea, ×2.8; *f*, disc floret, ×2.8; *g*, achene, ×2.8; all from type.

74. **Bidens graveolens** Mart. Isis 1824: 590. 1824. Pl. LIV.

Bidens venosa Gardn. in Hook. Lond. Journ. Bot. 7: 405. 1848.

Bidens Regnellii Schz. Bip. Linnaea 22: 570. 1849 (nomen).

Herba stricta, perennis, glaberrima, 8–12 dm. alta, caule tereti vel superne angulato, apicem versus ramoso, e basi tumida et lignea. Folia sessilia, suberecta, rigida, oblonga vel cuneato-oblanceolata, apice acuta vel interdum orbiculata, 5–9 cm. longa et 2–3 cm. lata, tripli- vel quintuplinervata, utrinque perspicue venosa, grosse serrata 7–12 dentibus in unico latere. Capitula terminalia, paniculata vel interdum subcorymbosa, longe pedunculata et breviter pedicellata pedicellis plerumque 3–11 mm. rarius usque ad 6 cm. longis, discoidea, ad anthesin 6–9 mm. lata et 9–14 mm. alta, floribus (fide Riedelii et Lundii) atrorubescentibus et sapore odoreque *Crithmo maritimo* similibus. Involucri (sicci rubro-brunnei) bracteae exteriores 4–6, lineares, crassiores, acriter calloso-apiculatae, glanduloso-rugosae, saepe pubescentes, nunc tantum circ. 5–6 mm. nunc etiam 8–10 mm. longae, interiores oblongae vel oblongo-lanceolatae, 8–13 mm. longae. Achaenia linearia, tetragona, glabra vel supra et ad apicem erecto-hispida, plumbeo-nigra (vel ad apicem straminea), corpore 1.1–1.5 cm. longa et 1.1–1.4 mm. lata, biaristata aristis erectis retrorsum scabris et 1–4 mm. longis vel rarius exaristata.

Type specimen: Collected by *Karl Friedrich Philipp Von Martius*, on high, grassy plains, Diamantina, Minas Geraes, Brazil, March (1817–1820).[1]

[1] Should be at Brussels (Bruss.; cf. Sherff, Bot. Gaz. 81: 247, footnote 3. 1926). I have studied the authentic specimen at Munich (Mun.).

Distribution: Central and eastern Brazil.

Specimens examined: *P. Claussen*, Minas Geraes, January–April, 1840 (Brit.); *G. Gardner* 4257, fields between Arrayas and San Domingos, Goyaz, May, 1840 (type collection, *Bidens venosa* Gardn.: Berl.; Brit., 2 sheets; Del., 2 sheets; Kew, 2 sheets; Mus. V.; N.Y.; Par.); *A. Glaziou* 18315, Morro do Pires, Minas Geraes, January, 1891 (Berl.; Cop.; Kew; Par.); *idem* 21588, Corrego do Brejo, Goyaz, December 6, 1894 (Berl.; Par., 2 sheets); *Lund*, in fields, Batataes and Franca, State of São Paulo (Cop.); *idem*, in fields, Caxoeira do Campo, February, 1835 (Cop.); *Martius*, high, grassy plains, Diamantina, Minas Geraes, March (cotype, Mun.); *Pohl*, Olio d'Agna (Mus. V.); *idem* 605, Brazil (Berl.; Kew, 2 sheets); *idem* 4382, Brazil (Mus. V.); *A. F. Regnell* II: 164, Caldas, Minas Geraes, February and December, 1847 (sub nom. *Bidente Regnellii* Schz. Bip.; Berl.; Par.); *idem* (similiter) II: 164, Batataes, São Paulo, February, 1849 (Stockh.); *idem* (similiter) II: 164, Caldas, April 18, 1867 (Stockh., 3 sheets); *Riedel & Lund*, Brazil (Kew, 2 sheets; Par.); *iidem* 2326, grassy fields, Batataes and Franca and elsewhere between the Rio Pardo and the Rio Grande, São Paulo, May–June, 1834 (Petrop., 4 sheets); *A. de Saint Hilaire* 1200, Minas Geraes, 1816 (Par., 2 sheets); *Eugene Warming*, Lagoa Santa, Minas Geraes, February–April, 1864 (Cop.); *idem*, Lagoa Santa, March 7, 1865 (Cop.; N.Y.; Par.); *idem* 637, Lagoa Santa, March, 1866 (Cop.); *Widgren*, Caldas, Minas Geraes, February 17, 1846 (Stockh.).

EXPLANATION OF PLATE LIV

Bidens graveolens: a (lower), *b* (upper), portions of flowering and fruiting specimen, ×0.67; *c*, exterior involucral bract, ×2.68; *d*, interior involucral bract, ×2.68; *e*, palea, ×2.68; *f*, disc floret, ×4; *g*, achene, ×2.68; *h*, achene, ×2; all from *Gardner* 4257 (cotype of *Bidens venosa* Gardn.), in Hb. Kew.

75. **Bidens fistulosa** Schz. Bip. ex Baker in Mart. Fl. Bras. 6, pt. 3: 247. 1884. Pl. LV.

Perennis, herbacea, glaberrima, 9–15 dm. alta; caule simplici, e radice crassiuscula lignosaque, tereti, abunde et perspicue striato, cavo (sed medulla plus minusve abundante), internodiis medianis longissimis (1.5–4.3 dm.) et perspicuis; ramis paucis, elongatis, subnudis, suberectis. Folia sessilia, 3–4 juga, non serrata, adscendentia, non ciliata, firmula, venis inter se paribus intervallis distantibus; inferiora indivisa, squamis non valde dissimilia, breviter linearioblonga, obtusa, ± 8 mm. longa et ± 3 mm. lata; principalia indivisa

vel interdum 2- vel 3-partita, usque ad 3.5 cm. longa, lamina segmentisve anguste linearibus, 0.2–1 mm. latis. Capitula 4–6, laxe corymbosa in pedunculis ramos superiores terminantibus et usque ad 1 dm. longis, ut videtur discoidea, disco demum (achaeniis non inclusis) ± 1.4 cm. lato et 8 mm. alto. Involucrum glabrum vel minutissime pubescens; bracteis exterioribus circ. 8, linearibus, 4–5 mm. longis; interioribus lanceolatis, 5–7 mm. longis. Achaenia matura linearia, obcompresso-tetragona vel subplana, brunneo-atra, omnino circ. 16-sulcata, glabra, corpore 15–17 mm. longa, biaristata; aristis erecto-patentibus, subulatis, levibus, 1.5–2.5 mm. longis, ut videtur saepe caducis.

Type specimen: Collected by *Ludwig Riedel*, No. 506, in fields at Rio Pardo, Brazil, September, 1826 (Par.).

Distribution: Southeastern Brazil.

Specimens examined: *Riedel* 506 (type, Par.: cotypes, Kew; Petrop., 2 sheets); *H. A. Weddell* 2996, Goyaz to Cuyabá, November–December, 1844 (Par., 3 sheets).

With its remarkably long cauline internodes, these reaching a length even of 43 cm., its numerous regular cauline striations, its abbreviated, linear, parallel-veined leaves, etc., *Bidens fistulosa* occupies a unique position in the genus and is closely approached by no other known species.

EXPLANATION OF PLATE LV

Bidens fistulosa: a (lower), *b* (upper), portions of flowering and fruiting plant, ×0.68; *c*, exterior involucral bract, ×4.06; *d*, interior involucral bract, ×4.06; *e*, palea, ×3.38; *f*, *g*, disc florets, ×3.38; *h* (shortest outer), *i* (longest inner), achenes, ×2.7; all from *Weddell* 2996, in Hb. Par.

76. **Bidens Bidentoides** (Nutt.) Britt. Bull. Torr. Bot. Club 20: 281. 1893. Pl. LVI.

Diodonta Bidentoides Nutt. Trans. Amer. Phil. Soc. ser. 2. 7: 361. 1841.

Coreopsis Bidentoides (Nutt.) Torr. & Gray, Fl. N. Amer. 2: 339. 1842.

Diatonta Bidentoides Nutt. ex Walp. Repert. 2: 615. 1843 (sphalm).

Flores tubulosi glabri, achaeniis corpore 6.5–13 mm. longis et circ. 0.7–1 mm. latis, aristis 6–9 mm. longis; foliis basi raro lobatis, dentibus raro divaricatis.....*B. Bidentoides* sensu stricto.

Flores tubulosi inferne sparsim pilosi, achaeniis corpore 6–10 mm. longis et 1–1.5 mm. latis; folia basi saepe lobatis, dentibus acribus saepe divaricatis.....var. *β. mariana.*

Herba annua, erecta, glabra; caule paniculato-ramoso, purpurascenti, 2–8 dm. alto. Folia ad basim in petiolos tenues 1–3.5 cm. longos attenuata, petiolo adjecto 0.5–1.8 dm. longa, membranacea, indivisa vel raro 1–2-lobata, lanceolata, ad apicem longe acuminata, serrata. Capitula erecta, plerumque discoidea, demum late turbinata, disco usque ad 1.5–2 cm. longo et 1.3–1.7 cm. lato. Involucrum glabrum, bracteis exterioribus 4 vel 5, foliaceis, linearispathulatis, inaequalibus, 1.5–4.5 cm. longis; interioribus lanceolatis, valde membranaceis, apicem versus saepe etiam pseudo-petaloideis, discum subaequantibus. Flores ligulati saepius deficientes; tubulosi 4-lobati, omnino glabri. Achaenia anguste lineari-cuneata, adpressohispida, corpore 6.5–13 mm. longa et usque ad 1 mm. lata, apice biaristata aristis tenuibus antrorsum hispidis et etiam 6–9 mm. longis, vel saepe duabus aliis abortivis aristis imperfecte quadriaristata.

Type specimen: No type was cited by Nuttall. The original, dwarfed material described by him (Brit.) was thought to have come from the vicinity of Philadelphia, Pennsylvania. A sheet of better developed material (Phila.), however, was, for a certainty, collected by *Nuttall* at Philadelphia and is labeled in Nuttall's own handwriting.

Distribution: About mouth of Susquehanna River, Maryland; also ascending Delaware River to Tinicum, Pennsylvania, and Maurice River to Millville, New Jersey.

Specimens examined: *E. B. Bartram* 1295, Delaware River shore, Morrisville, Pennsylvania, October 9, 1910 (Gray; Phila.); *C. A. Boice*, on ballast, Camden, New Jersey, October 2, 1879 (Phila., 2 sheets); *W. H. Canby*, near Wilmington, Delaware (Field; forma radiis parvis); *idem*, Delaware River shores, Wilmington, October, 1865 (Field; Kew); *A. Commons*, tidal banks of Delaware River, Wilmington, October 3, 1866 (Field); *idem*, eodem loco, August 31, 1899 (Phila.); *N. C. Fassett* 257, tidal shores of Hudson River, Glenmont, Bethlehem, New York, Sept. 18, 1922 (Gray); *Albrecht Jahn*, Delair, New Jersey, September 26, 1897 (Phila.); *idem*, below Washington Park, New Jersey, September 14, 1895 (Phila.); *Bayard Long*, river shore, Delair, New Jersey, September 30, 1907 (Phila.); *idem*, muddy shore of Maurice River, Millville, New Jersey, October 7, 1909 (Gray; Phila.); *Alex. MacElwee* 1992, muddy shores of Delaware River, West Deptford, New Jersey, September 20, 1900 (Phila., 2 sheets); *I. C. Martindale*, Philadelphia, Pennsylvania, 1870 (Phila.); *idem*, Camden, New Jersey, September, 1879 (Field); *H. B. Meredith*, Delaware River shore, Taylor, New Jersey, October

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3, 1923 (Phila.); *Thomas Nuttall* (type material: Brit.; Phila.); *T. C. Palmer*, tidal banks of Delaware River, Chester, Pennsylvania, September 9, 1896 (Gray); *C. F. Parker*, shores of Delaware River, Camden, New Jersey, September 25, 1867 (Field); *idem*, eodem loco, September 21, 1874 (Field; Kew; Mo.); *A. H. Smith*, Tinicum, Pennsylvania, October, 1866 (Phila.); *idem*, tidal marsh, eodem loco, September 23, 1867 (Field); *idem*, abundant, growing 3–4 ft. high along tidal marshes below Philadelphia, Pennsylvania, September 24, 1867 (U.S.); *idem* 59 p.p., tidal mud, Tinicum, Pennsylvania, October 6, 1866 (Phila.); *Witmer Stone*, shores of Delaware River, Fish House, New Jersey, September 18, 1908 (Phila.); *H. K. Svenson*, tidal shores of Hudson River, Rensselaer, New York, October 15, 1922 (Gray, 2 sheets); *W. Trimble*, vicinity of Bridgeport, New Jersey, October 1, 1883 (Phila.); *C. S. Williamson*, shores of Delaware River, Bordentown, New Jersey, September 11, 1904 (Phila.); *T. A. Williamson*, Camden, New Jersey, September, 1897 (Gray).

Nuttall (loc. cit.) classed the five United States species, *Bidens coronata*, *B. mitis*, *B. aristosa*, *B. polylepis*, and *B. Bidentoides* under his new genus *Diodonta*. For *B. polylepis* (*B. involucrata* [Nutt.] Britt.) he erected the separate subgeneric section *Meduseae* (in reference to its medusoid exterior involucres). For *B. Bidentoides* he erected the section *Heterodonta*. His doubts about the status of *Heterodonta* are shown by his use of an interrogation mark and further by his words (loc. cit.) "this section, or rather genus." In recent years, authors have been uniform in accepting Britton's reference of Nuttall's plant to the genus *Bidens*. The names *Diodonta* and *Heterodonta*, in so far as they represented generic concepts, have been entirely abandoned.[1]

Bidens Bidentoides var. *β.* **mariana** (Blake) Sherff, Bot. Gaz. 90: 394. 1930.

Bidens mariana Blake, Rhodora 31: 88, *fig. 1*. 1929.

Folia basim versus saepe profunde laciniato-lobata, marginibus acriter serrata dentibus interdum divaricatis, principalia petiolo adjecto 13–24 cm. longa. Flores tubulosi inferne sparsim pilosi.

[1] By creating the name *Diodonta*, Nuttall sought to make a place between *Coreopsis* and *Bidens* for several species which, in the upward direction of the barbs or bristles on their achenial awns, were considered more closely allied to *Coreopsis* and yet, in general aspect, were seen to be closer to *Bidens*. We may note that Cassini's employment of the name *Campylotheca* for another group of intergradient species marked a similar attempt. In either case, it is doubtful if competent botanists in the future will ever again seek to segregate the intermediate forms under separate generic names (cf. pp. 17–23).

Achaenia corpore 6–10 mm. longa et 1–1.5 mm. lata, plerumque 2- (raro usque ad 4-) aristata aristis 3–6 mm. longis.

Type specimen: Collected by *Sidney F. Blake*, No. 9698, on sandy shore of Northeast River, near Carpenter's Point, Charlestown, Maryland, September 17, 1926 (U.S.).

Distribution: Maryland.

Specimens examined: *Blake* 9698 (type, U.S.: cotypes, Field; Gray); *idem* 9703, sandy shore of Susquehanna River, Havre de Grace, September 17, 1926 (Field; Gray; U.S.); *G. H. Shull* 399, in vegetable refuse at mouth of drain of bog one-half mile south-southwest of Havre de Grace, September 20, 1902 (Gray; Mo.; N.Y.).

In 1926, Dr. S. F. Blake submitted his specimens Nos. 9698 and 9703 to me for study. He had suspected them of representing a new species. Notwithstanding this, I felt compelled at that time to refer them to *Bidens Bidentoides*. Later, he published his *B. mariana*, based upon these and certain other plants. This naturally led to a careful investigation of the entire matter on my part. Especially did a survey of the closely related *B. hyperborea* and *B. connata*, together with their several varieties, prove helpful. In this way it was found at once that *B. mariana* differed from *B. Bidentoides* to about the same extent as, for example, *B. connata* var. *fallax* differed from *B. connata* var. *typica*. To recognize *B. mariana* as a species, therefore, would immediately (if consistency is to be sought) entail an elevation of numerous forms that Fassett, Fernald, Fernald and St. John, and other writers have regarded as varieties. It has seemed wiser to adopt the alternative course and reduce *B. mariana* to varietal rank.

EXPLANATION OF PLATE LVI

Bidens Bidentoides: a, flowering and fruiting specimen, ×0.62; *b*, exterior involucral bract, ×1.86; *c*, interior involucral bract, ×1.86; *d*, palea, ×1.86; *e*, disc floret, ×3.72; *f*, achene, ×3.1; *a*, from *Shull* 399, in Hb. Mo.; *b–f*, from *William M. Canby*, Delaware River, above Wilmington, August 20, 1878, in Hb. Field.

77. **Bidens Eatonii** Fern. Rhodora 5: 92, *pl. 45, figs. 11–13*. 1903. Pl. LVII, figs. *a–f*.

Bidens Eatonii var. *typica* Fass. Rhodora 27: 143. 1925.

a. Achaeniorum interiorum corpora 6.8–9 mm. longa; aristis 2, rariter 4.

b. Capitula saltem juvenia anguste cylindrica.

c. Aristae retrorsum hamosae.....*B. Eatonii* sensu stricto.

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c. Aristae antrorsum hamosae.....var. *β. fallax.*

b. Capitula late cylindrica vel etiam campanulata.

c. Involucri bracteae interiores colore nunc jejune flavo nunc atro-brunneo striatae; foliis inferioribus saepe tripartitis.

d. Aristae omnino retrorsum hamosae.....var. *γ. interstes.*

d. Aristae retrorsum atque antrorsum hamosae.

e. Aristae 2.8–3.7 mm. longae.....var. *δ. illicita.*

e. Aristae 0.5–2 mm. longae.....var. *ε. mutabilis.*

c. Involucri bracteae interiores plerumque nitenti-striatae striis succinis vel purpureo-brunneis, aevo demum nitenti-nigrescentibus; foliis simplicibus.....var. *ζ. simulans.*

a. Achaeniorum interiorum corpora 9–11 mm. longa, aristis saepius 4.

b. Capitula plerumque cylindrica; foliis petiolatis petiolis 1–3 cm. longis, inferioribus saepe divisis.....var. *η. kennebecensis.*

b. Capitula subcylindrica vel latiora, etiam campanulata; foliis subsessilibus vel breviter lateque alato-petiolatis, non divisis. var. *θ. major.*

Herba annua, erecta, glabra, simplex vel ramosa, 2.5–6 dm. alta. Folia basi in petiolos tenues vel alato-marginatos 1–3.5 cm. longos attenuata, petiolo adjecto 0.5–1.5 dm. longa, membranacea, indivisa vel saepe lobis lateralibus 1 vel 2 instructa, lanceolata, apice longe acuminata, serrata. Capitula erecta, discoidea, juvenia anguste cylindrica demum turbinato-cylindrica, disco 1.1–1.4 cm. alto et 0.8–1.1 cm. lato. Involucri bracteae exteriores 3–5, foliaceae, 1–2 (–3) cm. longae; interiores quam discus paulo breviores. Achaenia 8–25, plana, lineari-oblanceolata vel anguste cuneata, duabus faciebus uninervata (ac saepe manifeste vel obscure striata) et sparsissime piloso-hispida, marginibus basaliter 1-paucis hamis antrorsum aliter plurime retrorsum hamosa, corpore exteriora 6–6.8 mm. interiora 6.8–9 mm. longa, omnia 1–1.7 mm. lata, apice 2–4-aristata aristis retrorsum hamosis et 2–4.3 mm. longis.

Type specimen: Collected by *Alvah A. Eaton,* brackish shores of Merrimac River, Newburyport, Massachusetts, September, 1902 (Gray?).

Distribution: About mouth of Merrimac River, Massachusetts.

Specimens examined: *A. A. Eaton,* shore of Merrimac River, below Newburyport, September 26, 1903 (N. Eng.); *idem & M. L. Fernald,* Salisbury, October 2, 1902 (Gray); *iidem,* brackish, muddy margin of Merrimac River, Newburyport, October 2, 1902 (Can.;

Gray, 5 sheets; N. Eng.); *A. A. Eaton & B. L. Robinson*, shores of Merrimac River at the "Laurels," Newburyport, September, 1903 (N.Y.).

As with, for example, *Bidens Bidentoides* and some of the varieties of *B. connata* and *B. hyperborea*, geographic isolation and local conditions of the habitats appear to afford a potent stimulus for the inducement of distinct forms. The duplicate specimens sent out to various herbaria have not been in all cases sufficiently mature or distinctive to impart an adequate concept of the species or variety in question. At present the collections of *B. Eatonii* and varieties in Gray Herbarium, though scanty to be sure, are still more complete than found anywhere else. After a close study of these materials at Gray Herbarium, and having in mind the various considerations of endemism mentioned by Fassett (Rhodora 27: 142. 1925) and other writers, I have deemed it wise to make the minimum of changes in their nomenclatural status.

Occasionally in various parts of the genus *Bidens*, plants are found which have had the tops broken off or for some other reason have become especially ramose, often fastigiately so. The heads are usually much dwarfed and much more numerous in such cases. The technical characters are then usually somewhat abnormal. *Bidens multiceps* Fass. (Rhodora 27: 145. 1925), described as a hypothetical hybrid of *B. connata* × *Eatonii*, may represent such a case.[1] Three of the specimens cited by Fassett and examined by me (*Johnston & Fassett* 903 and 905, tidal shores of the Taunton River, Massachusetts, October 21, 1923, Gray; *iidem* 906, tidal shores, Three-mile River, Dighton, Massachusetts, October 21, 1923, N. Eng., type) appear to be merely abnormal growth forms of *B. Eatonii*. A collection by S. F. Blake, however, was made in the general type locality (*Blake* 10771, tidal shore of Three-mile River, North Dighton, Massachusetts, September 20, 1928, Gray), and this shows some plants of apparently natural growth forms that are atypic for *B. Eatonii*. But even here, there is one specimen of the teratological kind. Furthermore, an additional collection by Blake (10771*A* and *B;* Gray) shows plants too close to *B. connata* and its var. *petiolata*.

[1] "*B. connata* × *Eatonii* (?), planta 2–6 dm. alta ramosissima super basem simplicem; foliis lanceolatis simplicibus 2–4 cm. longis integris vel cum dentibus utrinque 1–2 instructis; petiolis brevibus; capitulis multis late cylindratis, terminalibus 4–7 mm. altis 15–18-floris; bracteis exterioribus 1–1.5 cm. longis integris latioribus ad apicem obtusum; achaeniis exterioribus 4–7 mm. longis, planis, 2–4 aristis retrorso-barbatis; achaeniis interioribus 7–8 mm. longis, planis vel trigonis vel saepe in costis alatis, aristis 2–4 retrorso-barbatis." (Fass. loc. cit.)

Bidens Eatonii var. *β.* **fallax** Fern. Rhodora 5: 92, *pl. 45, fig. 14.* 1903. Pl. LVII, fig. *g.*

A specie differt achaeniorum aristis erecte barbatis.

Type specimen: Collected by *Alvah A. Eaton*, brackish shore of Merrimac River, Newburyport, Massachusetts, September, 1902 (Gray).

Distribution: About the mouth of the Merrimac River, Massachusetts.

Specimens examined: *A. A. Eaton*, Moseley's, Newburyport (N. Eng.); *idem*, brackish shore of Merrimac River, Newburyport (type, Gray, 3 sheets); *idem & M. L. Fernald*, brackish, muddy bank of Merrimac River, Newburyport, October 2, 1902 (Gray; N. Eng., 2 sheets); *iidem*, brackish margins of pools near Merrimac River, Salisbury, October 2, 1902 (Gray); *A. A. Eaton & B. L. Robinson*, muddy shores of Merrimac River at the "Laurels," Newburyport, September, 1903 (N.Y.).

Bidens Eatonii var. *γ.* **interstes** Fass. Rhodora 27: 143. 1925.

Bidens heterodoxa var. *interstes* Fass. op. cit. 26: 178. 1924.

Herba 1–8 dm. alta. Folia petiolata petiolis marginatis vel anguste alatis 1–5 cm. longis, petiolo adjecto usque ad 17 cm. longa et 4 cm. lata, lanceolata vel rarius anguste ovata, serrata, inferiora saepe profunde secta vel tripartita. Capitula campanulata, principalia 8–10 mm. alta et 8–12 mm. lata. Involucri bracteae exteriores 2–5, plerumque 3, suberectae, lineari-oblanceolatae, acutae; interiores striis nunc debiliter flavis nunc atro-brunneis striatae. Achaenia plana vel costis medianis paulo carinata, exteriora corpore 5.5–6.5 mm. interiora corpore 6.5–8 mm. longa, omnia marginaliter retrorsum vel ad basim antrorsum hamosa; aristis 2 vel rarius 4, retrorsum hamosis, marginalibus 1.5–4 mm. longis, intermediis multo brevioribus.

Type specimen: Collected by *Norman Carter Fassett*, No. 852, rocky places on tidal shores of the Kennebec River, Gardiner, Maine, September 18, 1923 (Gray).

Distribution: About estuaries, Maine.

Specimens examined: *N. C. Fassett* 852 (type, Gray); *idem* 920, rocky places, tidal shores of Kennebec River, Gardiner, September 18, 1923 (Gray); *idem* 2101, Hatch's Corners, West Dresden, September 9, 1924 (Gray); *idem* 2120, estuary of Sheepscot River, Alna, September 12, 1924 (Field; Gray); *idem* 2122, tidal shores at mouth of Eastern River, Dresden, September 13, 1924 (Gray);

idem 2125, tidal shores of Kennebec River, Woolwich, September 18, 1924 (Gray); *idem* 2127, estuary of Kennebec River, South Gardiner, September 16, 1924 (Field; Gray); *idem* 2128, from type station, September 16, 1924 (Field; Gray).

"The achenes are similar to those of var. *typica*, but a little broader in proportion to their length, while the heads are campanulate instead of cylindric" (Fassett, op. cit. 27: 143. 1925). The general aspect of the plants is very close to and in some cases identical with that of *B. connata* var. *petiolata*, compelling an examination of the achenes for certain identification.

Bidens Eatonii var. δ. **illicita** Blake, Rhodora 31: 100. 1929.

Capitula majora campanulata, circ. 30–32-flora. Achaenia exteriora corpore 6–7 mm. longa et 2 mm. lata, 2-aristata; interiora corpore 6.8–7.5 mm. longa et 1.5–1.8 mm. lata, 2–3-aristata, pilis marginalibus omnibus antrorsis vel rariter perpaucis ad basim extremam retrorsis; aristis 2.8–3.7 mm. longis, hamosis (basi antrorsum, medio retrorsum vel utroque, apice antrorsum aut retrorsum).

Type specimen: Collected by *Sidney F. Blake*, No. 10784*A*, tidal shore of Merrimac River, Amesbury, Massachusetts, September 22, 1928 (U.S.).

Distribution: Known only from type locality in Massachusetts.

Specimens examined: *Blake* 10784*A* (type, U.S.).

Bidens Eatonii var. ε. **mutabilis** Fass. Rhodora 27: 143. 1925.

Herba habitu foliisque var. *interstitem* valde simulans. Achaenia exteriora corpore 5.5–6 mm. interiora corpore 7–7.5 mm. longa, aristis 2, retrorsum antrorsumque setosis, 0.5–2 mm. longis.

Type specimen: Collected by *Norman Carter Fassett*, No. 2116, tidal estuary shores of the Kennebec River, Cedar Grove, Maine, September 9, 1924 (Gray).

Distribution: Known only from mouth of Kennebec River, Maine.

Specimens examined: *N. C. Fassett* 2116 (type, Gray); *idem* 2123, estuary of Kennebec River, Dresden, September 16, 1924 (Field; Gray).

Bidens Eatonii var. ζ. **simulans** Fass. Rhodora 27: 144. 1925.

Habitu achaeniisque var. *interstitem* simulans. Folia lanceolata, simplicia. Involucri bracteae interiores plerumque nitenti-striatae striis succinis vel purpureo-brunneis, aevo demum nitenti-nigrescentibus.

Type specimen: Collected by *Richard W. Woodward*, in brackish marsh, Old Lyme, Connecticut, October 1, 1915 (Gray).

Distribution: About mouth of Connecticut River, Connecticut.

Specimens examined: *N. C. Fassett* 2363, tidal shores of Connecticut River, Essex, October 13, 1924 (Gray); *idem* 2364, tidal shores of Connecticut River, East Haddam, October 12, 1924 (Gray); *R. W. Woodward*, in brackish marsh (type, Gray); *idem*, hidden among tall grass and sedges in brackish marsh, Old Lyme, September 9, 1917 (Gray; N. Eng.); *idem*, eodem loco, September 29, 1917 (Gray, 2 sheets; N. Eng.); *idem*, sandy shore just above high water line, Old Lyme, September 2, 1918 (Gray; N. Eng.).

A variety too close to var. *interstes* of Maine. The technical characters relied upon are of doubtful value. The floras of intermediate estuaries from Connecticut to Maine will perhaps yield overlapping and intergrading forms.

Bidens Eatonii var. *η*. **kennebecensis** Fern. Rhodora 19: 76. 1917.

Folia petiolata petiolis 1–3 cm. longis, inferiora saepe divisa. Capitula plerumque cylindrica. Achaenia exteriora corpore 8.8–9.8 mm. interiora corpore 9.5–10.5 mm. longa.

Type specimen: Collected by *Merritt Lyndon Fernald* and *Bayard Long*, No. 14822, tidal mud flats and swales by Cathance River, Bowdoinham, Maine, September 14–19, 1916 (Gray).

Distribution: Maine to Massachusetts.

Specimens examined: *N. C. Fassett* 140, tidal swales of Androscoggin River, Brunswick, Maine, September 17, 1921 (N. Eng.); *idem* 2130, tidal shores of Eastern River, Dresden Mills, Maine, September 16, 1924 (Gray); *idem* 2300, tidal shores of Merrimac River, Amesbury, Massachusetts, October 16, 1924 (Gray); *idem* 2362, eodem loco et tempore (Gray); *Fernald & Long* 14822 (type, Gray); *iidem* 14823, tidal mud flats, Cathance River, Bowdoinham, Maine, September 14–19, 1916 (Field; Gray, 2 sheets; Kew; N. Eng.); *iidem* 14824, border of salt marsh, Back River Creek, Woolwich, Maine, September 15, 1916 (Field; Gray; N. Eng.; Phila.).

Bidens Eatonii var. *θ*. **major** Fass. Rhodora 27: 144. 1925.

Herba 4–15 dm. alta, caulibus inferne saepe prostratis nudisque. Folia breviter alato-petiolata vel ad basim angustata et subsessilia, simplicia, lanceolata, grosse serrata, 0.5–1.5 dm. longa. Capitula subcylindrica vel campanulata, principalia 1.3 cm. alta, floribus 18–20 (–33). Involucri bracteae exteriores plerumque 3, lineares, acutae, 1–2.5 cm. longae et 2–3 mm. latae. Achaenia exteriora

corpore 6–7.5 mm. longa, interdum 2- saepius 3–4-aristata; interiora corpore (8–) 9–11 mm. longa (costis ad apicem saepe crassis), interdum 2- saepius 4-aristata; aristis retrorsum hamosis, usque ad 5 mm. longis.

Type specimen: Collected by *Norman Carter Fassett*, No. 2301, tidal shores of the Quinnipiac River, North Haven, Connecticut, October 14, 1924 (Gray).

Distribution: New York to Connecticut.

Specimens examined: *N. C. Fassett* 2301 (type, Gray); *idem* 2302, tidal shores of the Quinnipiac River, North Haven, Connecticut, October 14, 1924 (Gray); *idem* 2365, tidal flats, eodem loco et tempore (N. Eng.); *idem* 2368, growing 1.5 meters tall, tidal shores, eodem loco et tempore (N. Eng.); *H. K. Svenson*, shores of Hudson River, near upper limits of tide, Hudson, New York, September 30, 1923 (Gray).

EXPLANATION OF PLATE LVII

Bidens Eatonii, figs. *a–f: a*, flowering and fruiting specimen, ×0.63; *b*, exterior involucral bract, ×3.15; *c*, interior involucral bract, ×3.15; *d*, palea, ×3.15; *e*, disc floret, ×6.3; *f*, achene, ×3.15; all from type material.

Bidens Eatonii var. *fallax*, fig. *g:* achene, ×3.15; from type.

78. **Bidens aristosa** (Michx.) Britt. Bull. Torr. Bot. Club 20: 281. 1893. Pl. LVIII, fig. *h*.

Coreopsis aristosa Michx. Fl. Bor. Amer. 2: 140. 1803; Hook. f. in Curtis, Bot. Mag., *pl. 6462*. 1879.

Coreopsis aristata Muhl. ex Willd. Sp. Pl. 3: 2253. 1804.

Coreopsis aurea Lindl. Bot. Reg., *pl. 1228*. 1829 (nec alior.).

Diodonta aristosa (Michx.) Nutt. Trans. Amer. Phil. Soc. ser. 2. 7: 360. 1841.

Diatonta aristosa (Michx.) Nutt. ex Walp. Repert. 2: 615. 1843 (sphalm).

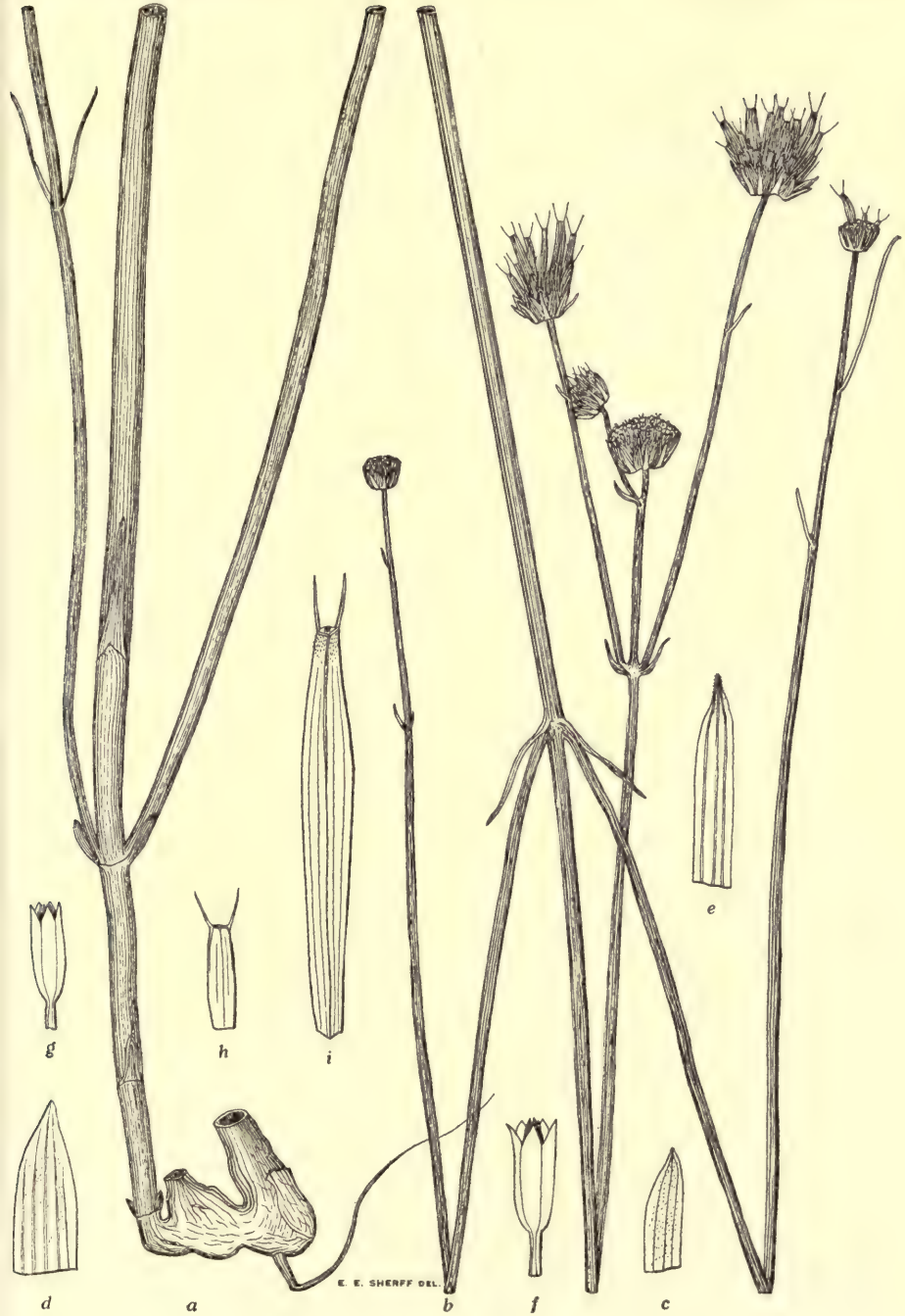
Achaenia exaristata ..... var. β. *mutica*.

Achaenia perspicue aristata.

Aristae antrorsum setosae ..... *B. aristosa* sensu stricto.

Aristae retrorsum hamosae ..... var. γ. *Fritcheyi*.

Herba annua vel biennis, glabrata vel parce pubescens, 0.3–1 (vel etiam –1.5) m. alta, caule purpurascenti, subtetragono, ramoso. Folia petiolata petiolis 1–1.5 (–3) cm. longis, petiolo adjecto 0.5–1.5 cm. longa, pinnata vel bipinnata, segmentis lanceolatis vel



BIDENS FISTULOSA Schz. Bip. *ex* Baker

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lineari-lanceolatis, acuminatis, inciso-serratis vel pinnatifidis, membranaceis, ciliatis, subtus parce pubescentibus. Capitula radiata, pansa ad anthesin 2–5 cm. lata et 7–9 mm. alta. Involucrum saepe hispidum, bracteis subaequalibus; exterioribus 8–10, linearibus, nunc parce nunc valde ciliatis, 0.5–1.2 cm. longis. Flores ligulati 6–10, aurei, ligula oblongo-oblanceolati, apice obtuso integri subdenticulative, 1–2.5 cm. longi. Achaenia plana vel subplana, subnigra vel flavidulo-nigra, apice bi- (rarissime quadri-) aristata aristis corpus aequantibus et erecto-setosis, margine suberecte aciculato-ciliata; interiora anguste cuneata vel obovato-cuneata, faciebus strigosa, 5–6.5 mm. longa; exteriora obovata, strigosa, saepe rugoso-tuberculata, margine plerumque interrupte crassiusculo-alata, interiora parce aequantia.

Type specimen: Collected by *André Michaux* in the general region of Illinois (Par.?; perhaps not seen by me).

Distribution: Maine to Minnesota, southward to Virginia, northern Alabama, central Mississippi, and southeastern Texas. Probably only adventive in eastern part of range.

Specimens examined: *S. M. Bain* 422 p.p., low fields, Jackson, Tennessee, September, 1892 (N.Y.); *B. F. Bush* 67, Dunklin County, Missouri, September 17, 1893 (Gray); *idem* 3659, swamps, Williamsville, Missouri, October 14, 1905 (Mo.); *idem* 5175 pro parte, Webb City, Missouri, September 25, 1908 (N.Y.; in Hb. Gray hic numerus *B. polylepis* var. *retrorsa* Sherff est); *idem* 8249, sandy fields, Courtney, Missouri, October 6, 1917 (Mo.); *A. Commons*, abundant in Cherry Isl. Marsh, Wilmington, Delaware, September, 1899 (N.Y.); *John Davis* 1319 pro parte, woods, Oakwood, Missouri, October 4, 1911 (Mo., cum var. *mutica* commixta); *idem* 3446, bottoms, Pike Co., Illinois, September 16, 1914 (Mo.); *idem* 3911, damp soil, Oakwood, Missouri, September 13, 1913 (Mo.); *idem* 6119 p.p., West Hannibal, Missouri, September 4, 1915 (Mo.); *idem* 6160 p.p., west of Oakwood, Missouri, Sept. 11, 1915 (Mo.); *idem* 6264 p.p. and 6276 p.p., Eolia, Missouri, August 30, 1915 (Mo.); *idem* 6346, fields, Oakwood, Missouri, November 12, 1915 (Mo.); *C. C. Deam* 10157, northwest of Hovey Lake, Posey Co., Indiana, September 20, 1911 (Deam); *idem* 32932, southwest of Oaktown, Indiana, September 19, 1920 (Deam); *idem* 33031 pro parte, vicinity of Mt. Vernon, Indiana, September 25, 1920 (Phila.); *idem* 34865, roadside, east of Kouts, Porter Co., Indiana, September 15, 1921 (Deam); *idem* 37935 p.p., south of Terre Haute, Indiana, September 13, 1922 (Deam); *F. W. Dewart* 40, St. Louis, Missouri, September 8, 1892 (Mo.); *H. Eggert*,

wet places, eodem loco, September 6, 1877 (N.Y.); *idem*, swampy places, vicinity of Haverhill, Missouri, September 19, 1893 (Mo.); *idem*, low ground, vicinity of Batesville, Mississippi, September 16, 1896 (Mo.); *George Engelmann*, St. Louis, Missouri, August, 1847 (U.S.); *N. M. Glatfelter*, St. Louis Co., Missouri, September 19, 1897 (U.S.); *Elihu Hall*, sloughs, Athens, Illinois, September, 1864 (Par.); *Mabel P. Hollister* 94, in woods, southeast of Prescott, Arkansas, August 29, 1912 (U.S.); *M. E. Jones*, wet ground, Grinnell, Iowa, August, 1877 (N.Y.); *O. E. Lansing, Jr.*, 2640, prairie, Roby, Indiana, September 20, 1906 (Mus. V.); *idem* 3502 pro parte, north of Catlin, Illinois, September 24, 1912 (Field, cum var. *Fritcheyi* commixta); *O. S. Ledman*, vacant lot, St. Louis, Missouri, September 12, 1916 (Mo.); *F. T. Macfarland & W. A. Anderson, Jr.*, 275, roadside and fields, La Center, Kentucky, August 15, 1923 (Mo.); *Charles Mohr*, Cullman, Alabama, August 6, 1896 (Field; achaeniis immaturis); *E. J. Palmer* 8928, open, sandy ground, Sicard, Ouachita Parish, Louisiana, October 13, 1915 (Mo.); *Mrs. E. E. Rogers* 259, Norwich, Connecticut, October 11, 1902 (Gray); *E. E. Sherff* 2032 pro parte, Chicago, Illinois, October 4, 1915 (Field); *C. W. Short*, wet prairies of Illinois, 1837 (N.Y.); *J. D. Smith*, low thickets, near Jackson, Mississippi, September 6, 1885 (Gray); *E. S. Steele*, near the water, Great Falls, Virginia, September 18, 1899 (U.S.); *W. F. Thurrow*, Hockley, Texas, 1890 (Field; achaeniis immaturis); *L. F. Ward*, between Sherman and Texarkana, Texas, September 22, 1877 (U.S.); *idem*, Arcadia, Missouri, August 24, 1878 (U.S.); *idem*, near Chesapeake Junction, District of Columbia, September 10, 1905 (U.S.); *John Wolf* 73, Canton, Illinois, 1881 (U.S.).

Bidens aristosa var. *β.* **mutica** A. Gray ex Gattinger, Fl. Tenn. 172. 1901; cf. K. M. Wiegand in Small, Fl. Southeast. U. S. 1281. 1903; cf. (A. Gray) Gatting. ex Fernald, Rhodora 15: 78. 1913. Pl. LVIII, figs. *a–g*.

Coreopsis aristosa var. *mutica* Gray, Syn. Fl. N. Amer. 1, pt. 2: 295. 1884.

Var. achaeniis exaristatis.

Type specimen: No type was mentioned by Gray, but at Gray Herbarium there are two sheets of material equivalent to types. One has a plant at the left by *Hale* from Louisiana. This has the printed label of Torrey and Gray's *Flora of North America*, also the inscription by Asa Gray (in pencil), *"C. aristosa exaristata!"* At the right is a better specimen, rich in achenes. This has the printed label of "George Engelmann, M.D. St. Louis, Mo." with the written

inscription (not in Gray's but doubtless in Engelmann's handwriting), "*Coreopsis aristata* var. *mutica* St. Louis Sept. 1846." An official *Synoptical Flora of North America* label is on the sheet, stamping it as authoritative for Gray's variety. The second sheet is labeled (in Asa Gray's hand), "*Coreopsis aristosa*, var. *mutica*. St. Louis, Fritchey." It likewise has the official *Synoptical Flora of North America* label attached.

Distribution: Massachusetts and Virginia westward to Illinois and Missouri. Probably only adventive in eastern part of range.

Specimens examined: *S. M. Bain* 297, low fields, Henderson, Tennessee, August 29, 1892 (Gray); *Florence Beckwith* 71, Quincy, Illinois, September, 1917 (Field); *B. F. Bush* 7741, dry soil, Livonia, Missouri, September 21, 1915 (Mo.); *idem* 9305, Courtney, Missouri, October 17, 1920 (Mo.); *W. M. Canby*, marsh, Wilmington, Delaware, September 5, 1900 (Carn.); *J. J. Carter*, shore of Safe Harbor, York Co., Pennsylvania, September 14, 1906 (Phila.); *idem*, Norfolk, Virginia, September 6, 1907 (Phila.); *John Davis*, meadows, Fall Creek, Adams Co., Illinois, September 16, 1914 (Del., 2 sheets); *idem* 24, roadsides, Oakwood, Missouri, September 13, 1913 (Mo., 2 sheets); *idem* 55, roadsides, Aberdeen, Missouri, September 29, 1912 (Mo.); *idem* 245, Eolia, Missouri, June 26, 1916 (Field); *idem* 1319 p.p., Oakwood, Missouri, October 4, 1911 (Mo.); *idem* 1348, meadows, eodem loco, September 4, 1915 (Mo.); *idem* 3293, rich banks, Hannibal, Missouri, September 7, 1916 (Mo.); *idem* 3431, bottoms, Bear Creek, eodem loco, September 18, 1914 (Mo., 2 sheets); *idem* 3433, roadsides, Eolia, Missouri, September 20, 1914 (Mo., 2 sheets); *idem* 3741, bottoms, Shepherd, Illinois, September 16, 1914 (Mo.); *idem* 3806, rich soil, bluffs of Mississippi River, Hannibal, Missouri, September 7, 1916 (Mo.); *idem* 3814, railroad banks, Helton Station, Missouri, September 12, 1914 (Mo.); *idem* 6119 p.p., meadows, west of Hannibal, Missouri, September 4, 1915 (Mo.); *idem* 6160 p.p., meadows, Oakwood, Missouri, Sept. 11, 1915 (Mo.); *idem* 6218, fields and bottoms, Canton, Missouri, September 8, 1915 (Mo., 2 sheets); *idem* 6264 p.p. and 6276 p.p., fields and roadsides, Eolia, Missouri, August 30, 1915 (Mo.); *idem* 6345 p.p., bluffs, Helton Station, Missouri, Sept. 12, 1915 (Mo.); *C. C. Deam* 12482, east of Dana, Indiana, Sept. 29, 1912 (Deam); *idem* 26524, bank of old channel of Kankakee River at the Baum Ridge, Porter Co., Indiana, September 15, 1918 (Deam); *idem* 29826, northeast of Kouts, Porter Co., Indiana, September 13, 1919 (Deam); *idem* 33031 pro parte, vicinity of Mt. Vernon, Indiana, September 25, 1920 (Phila.); *idem*

37928, south of Toronto, Indiana, September 12, 1922 (Deam); *T. Drummond*, St. Louis, Missouri, 1832 (Kew); *idem* 166, eodem loco (Kew); *George Engelmann*, vicinity of St. Louis, Missouri, September, 1846 (Gray; Mo.); *idem*, prairies and along fences, St. Louis, Missouri, August, 1847 (Berl.); *J. Q. A. Fritchey*, Bridgeton, Missouri, October 3, 1859 (Mo., 2 sheets); *F. C. Gates* 9953, Carthage, Illinois, September 5, 1916 (Field); *idem* 10041, Crooked Creek, Hancock Co., Illinois, September 10, 1916 (Field); *C. B. Graves* 259*a*, Windham, Connecticut, September 17, 1902 (Gray); *J. M. Greenman, Jr., & M. T. Greenman* 3712, Kirkwood, Missouri, September 7, 1913 (Mo.); *E. J. Hill* 107, wet ground, Chicago, Illinois, September 8, 1893 (Field); *Holton*, Illinois (Field); *John Kellogg* 146, Jerome, Missouri, September 15, 1913 (Mo., 2 sheets); *H. B. Meredith*, below Greenwich Point, Philadelphia, Pennsylvania, September 7, 1921 (Phila.); *H. N. Patterson*, vicinity of Oquawka, Illinois, September (Brit.; Carn.; Field; Kew, 2 sheets; N.Y.); *A. S. Pease* 3061, Soldiers' Field, Brighton, Massachusetts, October 6, 1903 (N. Eng.); *S. F. Poole* 118, Sharon, Massachusetts, September, 1905 (Gray); *T. C. Porter*, Tinicum, Pennsylvania, September 12, 1900 (Carn.); *H. W. Pretz* 1644, Lehigh River, Lehigh Co., Pennsylvania, September 13, 1908 (Phila.); *A. N. Rood*, Warren, Ohio, September 11, 1911 (Gray); *Eduard & Caecilie Seler* 4081, St. Louis, Missouri, September 23, 1904 (Berl., 2 sheets); *E. E. Sherff* 2032 pro parte, ditch, Chicago, Illinois, October 4, 1915 (Field, 4 sheets); *W. R. Taylor*, Essington, Pennsylvania, August 15, 1914 (Phila.).

The existence of a variety with awnless achenes was suspected by Torrey and Gray, who wrote, "If we mistake not, the achenia are sometimes awnless!" (Fl. N. Amer. 2: 340. 1843). Later, Gray (Syn. Fl. N. Amer. 1, pt. 2: 295. 1884) definitely published the varietal name *mutica* for the plants with awnless achenes. In 1901, Gattinger (loc. cit.) listed the variety under *Bidens aristosa* (Michx.) Britt., carelessly citing A. Gray as the author of the combination given, although Gray himself created the varietal name under a species of *Coreopsis*, not of *Bidens*. In 1913, Fernald (loc. cit.) dealt with this laxity in nomenclatural treatment and, with a view to establishing a more definite status for the variety, set it forth as "*B. aristosa*, var. *mutica* (Gray) Gattinger . . . ." It happens, however, that in 1903 Wiegand (loc. cit.), evidently unaware of Gattinger's treatment, published the combination "*B. aristosa mutica* (A. Gray) Wiegand." This, in turn, was overlooked by Fernald, but is clearly the alternative publication (rather than

Fernald's) that would have to be accepted by anyone disposed to attack the validity of Gattinger's treatment.[1]

Bidens aristosa var. γ. **Fritcheyi** Fern. Rhodora 15: 78. 1913. Pl. LVIII, fig. *i*.

Var. achaeniorum aristis retrorsum hamosis.

Type specimen: Collected by *John Quincy Adams Fritchey*, St. Louis County, Missouri, October 3, 1859 (Gray).

Distribution: Indiana and Kentucky to Illinois and Missouri; adventive in District of Columbia, Massachusetts, Maine, and perhaps elsewhere in the eastern United States.

Specimens examined: *S. M. Bain* 422 p.p., low fields, Jackson, Tennessee, September, 1892 (N.Y.); *Biltmore Herb.* 2060*a*, damp soil, Hollow Rock, Tennessee, August 14, 1897 (Mo.); *S. F. Blake* 8644, waste ground along Speedway, East Potomac Park, Washington, District of Columbia, October 1, 1923 (Field); *John Davis* 6119 p.p., dry woods, Hannibal, Missouri, Sept. 4, 1915 (Mo.); *idem* 6345 p.p., open woods, Marion County, Missouri, September 12, 1914 (Mo.); *C. C. Deam* 12160, west of Shelburn, Indiana, August 24, 1912 (Deam); *idem* 38126, roadside ditch, southwest of New Marion, Indiana, September 23, 1922 (Deam); *W. W. Eggleston* 5211, Kuttawa, Kentucky, September 27–October 9, 1909 (N.Y.); *idem* 5390, Stiles Station, Kentucky, October 6, 1909 (N.Y.); *C. E. Faxon*, made land, South Boston, Massachusetts, August, 1878 (Gray); *M. L. Fernald*, wool waste, North Berwick, Maine, August 25, 1897 (N. Eng.); *G. H. French*, Jackson Co., Illinois, September 4, 1878 (N.Y.); *J. Q. A. Fritchey*, St. Louis Co., Missouri, September 21, 1858 (Gray) and October 3, 1859 (type, Gray); *H. A. Gleason*, wet bottom lands, Herod, Illinois, August 23, 1902 (Deam); *idem* 41, Champaign, Illinois, September 29, 1898 (Gray); *Elihu Hall*, sloughs, Athens, Illinois, 1861 (Par.); *idem*, Athens, Illinois, September, 1868 (Field; Gray); *O. E. Lansing, Jr.*, 3502 pro parte, north of Catlin, Illinois, September 24, 1912 (Field, cum specie ipsa commixta, 2 sheets); *idem & E. E. Sherff* 40, common in moist ground, near Athens, Illinois, August 25, 1916 (Gray); *J. C. Parlin & M. L. Fernald* 958, around wool waste, North Berwick, Maine, September 25, 1897 (N. Eng.); *A. S. Pease* 12392, railroad ditch, Champaign, Illinois, September 11, 1909 (Gray); *Robert Ridgway*, Olney, Illinois,

[1] The name, according to established custom, must of course read *B. aristosa* var. *mutica*, followed either by "(Gray) Gray ex [or in] Gattinger" or, since Gray's name appears twice, by merely "Gray ex [or in] Gattinger." The second rendition accords with the style used in this monograph.

September 2, 1914 (Gray); *idem* 77, Fox Prairie, Olney, Illinois, September 11, 1917 (Field); *idem* 95, Sugar Creek Prairie, Richland County, Illinois, September 12, 1914 (Gray).

EXPLANATION OF PLATE LVIII, FIGS. *a–j*

Bidens aristosa, fig. *h:* from *John Davis* 1319, in Hb. Mo.

Bidens aristosa var. *mutica*, figs. *a–g: a*, fruiting specimen, ×0.63; *b*, exterior involucral bract, ×3.16; *c*, interior involucral bract, ×3.16; *d*, ray floret, ×1.26; *e*, palea, ×3.16; *f*, disc floret, ×3.16; *g*, achene, ×3.16; all from *Sherff* 2027, in Hb. Field.

Bidens aristosa var. *Fritcheyi*, fig. *i:* achenes, ×3.16; both from type.

79. **Bidens polylepis** Blake, Proc. Biol. Soc. Wash. 35: 78. 1922. Pl. LVIII, figs. *k–r*.

Coreopsis involucrata Nutt. Journ. Phila. Acad. 7: 74. 1834.

Diodonta involucrata Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 361. 1841.

Diatonta involucrata Nutt. ex Walp. Repert. 2: 615. 1843 (sphalm).

Bidens involucrata (Nutt.) Britt. Bull. Torr. Bot. Club 20: 281. 1893; non Philippi, Anal. Mus. Nac. Chile, Bot. 1891: 49. 1891 (cf. Sherff, Bot. Gaz. 76: 160. 1923).

Achaenia apice exaristata vel obscure bidentata dentibus erecto-hispidis.....*B. polylepis* sensu stricto.

Achaenia biaristata aristis retrorsum hamosis.....var. *β. retrorsa.*

Herba annua vel biennis, glabra, 0.3–1 m. alta; caule tetragono, ramoso. Folia petiolata petiolis usque ad 2.5 cm. longis, petiolo adjecto 8–15 cm. longa, plerumque bipinnata, foliolis lanceolatis vel lineari-lanceolatis, acuminatis, acriter serratis, membranaceis, ciliatis. Capitula radiata, pansa ad anthesin 2–5 cm. lata et 7–9 mm. alta. Involucri bracteae exteriores numerosae plerumque 15–20, saepius patentes vel reflexae, lineari-elongatae, perspicue hispido-ciliatae, dorso hispidae vel glabratae, 1–2.7 cm. longae, interiores lanceolatas manifeste superantes. Flores ligulati circ. 8, aurei, ligula oblongo-oblanceolati, apice integri vel obscure denticulati, 1–2.5 cm. longi. Achaenia plana, brunnea vel atro-brunnea, faciebus tuberculato-setosa vel fere glabra, apice calva vel obscure bidentata dentibus erecto-hispidis, margine interrupte crassiusculo-alata et antrorsum ciliata, exteriora cuneato-obovata circ. 5.5–6.5 mm. longa, interiora cuneato-oblanceolata corpore circ. 6.5–7.5 mm. longa.

Type specimen: Collected by *Thomas Nuttall* along the Salt River in Arkansas (Brit.).[1]

Distribution: From western Illinois westward to Iowa, Kansas, Colorado, and Texas; adventive eastward to Pennsylvania and Maryland.

Specimens examined: *E. B. Bartram*, Frazer, Pennsylvania, September 12, 1909 (Phila.); *John Bright*, Potomac River, near Hancock, Maryland, September 2, 1918 (Carn.); *S. H. Burnham*, Osawatomie, Kansas, September 1, 1893 (Gray); *B. F. Bush*, Courtney, Missouri, September 27, 1893 (Berl.); *idem* 170*A*, low ground, Greene Co., Missouri, September 21, 1893 (Gray; Kew); *idem* 170*B*, common on low ground, Jackson Co., Missouri, September 27, 1893 (U.S.); *idem* 319, abundant in wet prairie, Vinita, Oklahoma, September, 1894 (Mo.); *idem* 910, common on low ground, Sheffield, Missouri, September 6, 1896 (U.V.); *idem* 7767, bottoms, Sheffield, September 4, 1916 (Gray); *W. M. Canby*, high ground near Newport, Delaware, September 9, 1879 (Gray); *idem*, reclaimed marsh land, Wilmington, Delaware, September 25, 1899 (Gray); *idem*, Cherry Isl. Marsh, Wilmington, September 5, 1900 (Gray; Phila.);[2] *M. A. Carleton*, Johnson Co., Kansas, August 25, 1892 (Mo.); *idem*, St. George, Kansas, September 8, 1892 (N.Y.); *Albert Commons*, Cherry Isl. Marsh, Wilmington, Delaware, September 8, 1898 (Phila.) and 1899 (Gray);[2] *idem*, abundant, eodem loco, September 16, 1899 (Phila.); *Delzie Demaree* 13675, moist creeks, 9 miles southeast of Monticello, Drew Co., Arkansas, September 4, 1936 (Field); *T. Drummond*, St. Louis, Missouri, 1833 (Del.); *W. W. Eggleston* 12071, Carthage, Missouri, October 1–3, 1915 (N.Y.; U.S.); *A. Fendler* 398, prairie hollows near 110 Creek, Kansas, September 20, 1847 (Mo.); *idem* 444, eodem loco et tempore (Brit.); *T. J. & M. F. L. Fitzpatrick*, common in waste places, Decatur Co., Iowa, September 16, 1899 (N.Y.); *A. S. Hitchcock* 734, wet soil, Pottawatomie Co., Kansas, 1896 (Par., 2 sheets); *J. F. Joor*, Jacksonville, Texas, October 8, 1884 (Mo., 2 sheets); *W. A. Kellerman*, Manhattan, Kansas, September 2, 1886 (N.Y.; U.S.); ex *herb. Thomas Nuttall*, Salt River, Arkansas (type, Brit.); *J. H. Oyster*, Miami Co., Kansas, July, 1883 (Field); *C. C. Parry* 31, headwaters of Clear Creek and alpine ridges east of Middle Park, Colorado, 1861

[1] Nuttall cited secondly the material by *Dr. Zina Pitcher*. The Pitcher specimen is still extant (Phila.); also at least one duplicate of it (N.Y.).

[2] Plantae Canbyi Commonsiique in hac palude lectae *Bidenti aristosae* bracteis exterioribus debiliter vel valde adpropinquant. Una planta (*Commons*, September 8–16, 1899; Hb. N.Y.) pro *B. aristosa* a N. L. Brittonio habita est.

(Gray); *H. Patterson*, Oquawka, Illinois, 1873 (Gray); *Zina Pitcher*, Arkansas (N.Y.; Phila.); *M. P. Somes* 3832, Des Moines, Iowa, September 14, 1909 (N.Y.); *P. C. Standley* 8321, pasture, vicinity of Springfield, Missouri, August 28, 1911 (U.S.); *idem* 9049, open field, eodem loco, August 20, 1912 (U.S.); *idem* 9455, open field, vicinity of Strafford, Missouri, August 27, 1912 (U.S.); *G. W. Stevens* 2430, woods near Ottawa, Oklahoma, August 27, 1913 (Gray); *idem* 2544, moist slough, in shade by Spring River, near Ottawa, August 29, 1913 (Gray); *idem* 2991½, waste place, Tulsa, Oklahoma, October 30, 1913 (Gray); *W. C. Stevens*, Lawrence, Kansas, August (U.S.); *H. K. Svenson* 482, old field, Eva, Tennessee, August 28, 1922 (Gray); *William Trelease* 640, Truhey Creek, Joplin, Missouri, October 7, 1897 (Mo.); *S. S. Van Pelt*, Narrowsville, Pennsylvania, September 9, 1904 (Phila.); *Charles Wright*, Texas (Par.; Gray).

Daniels (Univ. Missouri Studies, Sci. Ser. 1: 378 [reprint 236]. 1907) lists a supposed hybrid of this species with *Bidens comosa*. Such a hybrid is unknown to me.

Bidens polylepis var. *β*. **retrorsa** Sherff, Bot. Gaz. 80: 386. 1925. Pl. LVIII, fig. *s*.

Bidens involucrata var. *retrorsa* Sherff, loc. cit.

A specie achaeniorum biaristatorum aristis retrorsum hamosis differt.

Type specimen: Collected by *B. F. Bush*, No. 5175 pro parte, Webb City, Missouri, September 25, 1908 (Gray).

Distribution: Known only from Indiana and Missouri.

Specimens examined: *Bush* 170, common on low ground, McDonald Co., Missouri, September 1, 1893 (Field); *idem* 5175 pro parte, Webb City, etc. (Gray; hic numerus in Hb. N.Y. vera *Bidens aristosa* est); *C. C. Deam* 35010, roadside north of Coal City, Indiana, September 22, 1921 (Deam; fragment, in Field); *E. J. Palmer* 1480, abundant on moist prairies, Webb City, Missouri, September 25, 1908 (Mo.).

EXPLANATION OF PLATE LVIII, FIGS. *k–s*

Bidens polylepis, figs. *k–r*: *k*, flowering and fruiting specimen, ×0.63; *l*, exterior involucral bract, ×3.16; *m*, interior involucral bract, ×3.16; *n*, ray corolla, ×1.26; *o*, palea, ×3.16; *p*, disc floret, ×3.16; *q*, *r*, achenes, ×3.6; *k*, mainly from type, in lesser part from *Zina Pitcher*, Arkansas, in Hb. Phila.; *l–r*, from *B. F. Bush*, Courtney, Missouri, September 27, 1893, in Hb. Berl.

Bidens polylepis var. *retrorsa*, fig. *s*: achene, ×3.16; from type.

BIDENS BIDENTOIDES (Nutt.) Britt.

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80. **Bidens coronata** (L.) Britt. Bull. Torr. Bot. Club 20: 281. 1893; cf. Sherff, Bot. Gaz. 56:495.1913. Pl. LIX, figs. *m* and *p–u*.

Coreopsis coronata L. Sp. Pl. ed. 2. 2: 1281. 1763 (ex descript., exclud. synon.).

Coreopsis trichosperma Michx. Fl. Bor. Amer. 2: 139. 1803.

Coreopsis trichosperma var. *aurea* Edwards, Bot. Reg. 1228. 1829 (non Nutt.).

Diodonta coronata (L.) Nutt. Trans. Amer. Phil. Soc. ser. 2. 7: 360. 1841.

Diatonta coronata (L.) Nutt. ex Walp. Repert. 2: 614. 1843 (sphalm).

Bidens trichosperma (Michx.) Britt. loc. cit.

Foliola plerumque lanceolato-linearia et inciso-dentata, achaeniis corpore 5–7 mm. longis..... *B. coronata* sensu stricto.

Foliola (segmentave) angustissime linearia et saepe etiam integra, achaeniis minoribus..... var. *β. tenuiloba.*

Herba annua vel biennis, glabra, erecta, ramosa, 3–15 dm. alta; caule subtereti, saepe purpurascenti. Folia petiolata petiolis 0.3–1.6 cm. longis, petiolo adjecto usque ad 1.4 dm. longa, pinnata (nonnulla inferiora saepe irregulariter bipinnata segmentis lanceolatis vel linearibus) vel rarissime indivisa lanceolataque, foliolis 3–7 (–9), minime ciliatis, acutis vel acuminatis, plerumque lanceolato-linearibus et inciso-dentatis. Capitula pauca vel multa, paniculato-corymbosa, radiata, pansa ad anthesin 2–6 cm. lata et 6–8 mm. alta. Involucrum basi plerumque glabrum; bracteis exterioribus 6–8, linearibus vel lineari-spathulatis, margine levibus vel ciliatis, extrinsecus rariter hispidis, disco rarissime longioribus, interiores ovato-lanceolatas subaequantibus. Flores ligulati 7–9, aurei, ligula elliptico-obovati vel obovato-lanceolati, 1–2.5 cm. longi, termino obtuse apiculati vel obsolete denticulati. Achaenia anguste cuneato-oblonga vel interiora cuneato-linearia, plana vel inconspicue quadrangulata, brunnea vel interdum subnigra, faciebus levia vel plus minusve rugoso-hispida, marginibus suberecte ciliata, corpore 5–7 mm. longa, apice biaristata aristis validis subulatisque 1–2 mm. longis, erecte setosis.

Type specimen: The single specimen in the Linnean Herbarium has on the back of its sheet "Pennsylvania" but Linnaeus apparently ignored or overlooked this and cited Virginia (then embracing much more territory than now) as the home of the species.

Distribution: From Massachusetts, southernmost Ontario, and northern Wisconsin southward and southwestward to Virginia, Kentucky, and Nebraska.

Specimens examined:[1] *H. G. Allebach*, salt marsh, Ocean City, New Jersey, October, 1918 (Phila.); *anon.*, Pennsylvania (Linn.); *G. B. Ashcroft*, Berea, Ohio, July, 1897 (Field); *E. B. Bartram*, Newport News, Virginia, September 16, 1907 (Phila.); *J. B. Brinton*, swamp, Westville, New Jersey, September 20, 1879 (Penn.); *idem*, Hammonton, New Jersey, September 6, 1891 (Penn.); *N. L. Britton*, Garretson's Meadows, Staten Isl., New York, September 23, 1892 (N.Y.); *idem*, Whiting, Indiana, August 29, 1893 (N.Y.); *idem* 1488, Staten Isl., New York, September 6, 1879 (Carn.); *John Bright*, salt meadow bogs, Cape May Co., New Jersey, September 4, 1925 (Carn.); *A. B. Burgess* 320, swampy ground near creek, Prairie Rhonde, Michigan, September 25, 1903 (Field); *Agnes Chase* 639, *Larix* swamp, Miller, Indiana, September 8, 1897 (Phila.); *eadem* 1699, prairie, Chicago, Illinois, August 28, 1901 (Field); *J. R. Churchill*, Rehoboth, coast of Delaware, September 10, 1908 (Gray); *Fred Clements* 2868, Carns, Nebraska, August 14, 1893 (Gray); *Albert Commons*, river shore, Cherry Isl. Marsh, Wilmington, Delaware, August 31, 1899 (Phila.); *idem*, Wilmington, September 16, 1899 (Phila.; forma foliis tripartitis, foliolis dentatis, terminali anguste lanceolato quam lateralibus oblongo-lanceolatis multo longiore sed achaeniis typica); *J. W. Congdon*, South Kingston, Rhode Island, September 7, 1878 (Carn.); *C. A. Davis* 5158, marshes, Alma, Michigan, September, 1892 (Phila.); *Mary A. Day & M. L. Fernald* 48, wet meadows of Neponset River, Dedham, Massachusetts, September 6, 1901 (Berl.; Boiss.; Can.; Carn.; Del.; Field; Kew; Phila.; U.V., etc.); *C. C. Deam*, swamp near Lake Gage, Steuben Co., Indiana, August 12, 1903 (Berl.); *idem* 5376, prairie south of Bluffton, Indiana, September 13, 1908 (U.V., 2 sheets); *idem* 19034, north of Medora, Indiana, September 13, 1915 (Deam; forma typica specimini Linnaei herbarii simillima); *idem* 22018, northwest of Laketown, Indiana, September 17, 1916 (Deam); *idem* 29813, near Waverly Beach, Indiana, September 13, 1919 (Deam); *idem* 30229, southwest of Vallonia, Indiana, September 27, 1919 (Penn.); *idem* 42209, southeast of Tefft, Indiana, August 19, 1925 (Deam); *C. K. Dodge*, near Port Huron, Michigan, August 31, 1894 (U.S.); *idem* 81, Rush Lake, Huron Co., Michigan, August 25, 1908 (Gray); *R. R. Dreisbach* 1117, Brown's Mills, Burlington Co., New Jersey, September 4, 1922 (Carn.; Phila.); *idem* 1139, Atsion, New Jersey, September 9, 1922 (Carn.); *idem* 1878, Ancora Station, New Jersey,

[1] No attempt was made to distinguish in various herbaria between the species proper and the form with narrower leaf divisions, var. *tenuiloba*. Thus all are listed here.

September 9, 1923 (Phila.); *idem* 1926, edge of pond, Deerfield, New Jersey, October 6, 1923 (Phila.); *A. A. Eaton*, North Easton, Massachusetts, September 11, 1903 (Berl.); *D. C. Eaton*, marshes, Hackensack, New Jersey (Field); *Fernald* 17613, Harwichport, Massachusetts, October 13, 1918 (Phila.); *idem & B. Long* 17612, near Fresh Pond, Dennis, Massachusetts, September 2, 1918 (Phila.); *Fernald, Hunnewell, & Long* 10690, near Chebacco Lake, Essex, Massachusetts, September 11, 1913 (N. Eng.; Phila.); *Freedley*, Pennsylvania (Del.); *C. D. Fretz*, May's Landing, New Jersey, September 12, 1912 (Phila.; forma foliis indivisis, lanceolatis, dentatis, anguste petiolatis; achaeniis atris, aristis brevibus patentibus); *H. A. Gleason & F. D. Shobe* 218, boggy prairie, Sun Lake, Lake Villa, Illinois, August 9, 1906 (Gray); *J. M. Greenman* 337, Riverside, Massachusetts, September 5, 1897 (Mo.); *J. H. Grove* 498, swamps, New Egypt, New Jersey, August 20, 1907 (Phila.); *J. W. Harshberger*, Cedar Bog, west of Point Pleasant, New Jersey, September 9, 1912 (Penn.); *A. A. Heller* 1247, Northwest, Virginia, September 6, 1893 (Penn.; Phila.); *P. Heuser*, Arlington, Staten Isl., New York, August 25, 1896 (Berl.); *idem*, eodem loco, September 8, 1896 (Berl., 2 sheets); *J. H. Holmes* 557, Salem Co., New Jersey, September, 1890 (U.S.); *L. S. Hopkins* 2335, Kent, Ohio, August 25, 1913 (Carn.); *Albrecht Jahn*, below Washington Park, New Jersey, September 14, 1895 (Phila.); *O. E. Jennings*, Pymatuning Swamp, Linesville, Pennsylvania, August 19, 1904 (Carn., 3 sheets; forma foliorum segmentis latioribus); *idem*, Sandy Lake, near Stoneboro, Pennsylvania, August 30, 1923 (Carn., 3 sheets); *T. H. Kearney* 2375, near Northwest, Virginia, November 8, 1898 (U.S.); *A. B. Klugh* 8, Point Pelee, Ontario, September 14, 1905 (Gray); *C. H. Knowlton*, cranberry bog, Harwich, Massachusetts, October 14, 1920 (Phila.); *Louis Krautter, Jr.*, Halsey, Nebraska, August 20, 1907 (Penn.); *W. Krebs* 61, swamps, Cleveland, Ohio, August–October (Berl.); *O. E. Lansing, Jr.*, 538, prairie swale, Hammond, Indiana, September 28, 1898 (Field); *idem* 2640, prairie, Roby, Indiana, September 20, 1906 (Berl.; Field); *idem* 2901, Pine, Indiana, September 28, 1910 (Gray); *idem* 3314, swamp, South Haven, Michigan, September 3, 1911 (Field); *I. A. Lapham*, swamps, Milwaukee, Wisconsin (Phila.); *C. D. Lippencott*, Swedesboro, New Jersey, September 10, 1892 (Phila.); *Bayard Long*, Manahawken, New Jersey, September 8, 1906 (Phila.); *idem* 4719, Mullica River, Atlantic Co., New Jersey, August 21, 1910 (Phila.); *idem* 4868, Hartford, New Jersey, September 5, 1910 (Phila.); *idem* 5195 and

5288, Forked River, Ocean Co., New Jersey, September 29, 1910 (Phila.); *idem* 6939, Ancora, New Jersey, October 28, 1911 (Phila.); *Alex. MacElwee*, Delaware River, Philadelphia, Pennsylvania, September 21, 1895 (Phila.); *John Macoun* 1150, Rondeau, Ontario, October, 1885 (Brit.); *idem* 5061, eodem loco, September 25, 1894 (Gray); *E. A. Mearns* 160, Minnesota River, Fort Snelling, Minnesota, August 29, 1889 (N.Y.); *André Michaux*, North America (type material of *Bidens trichosperma* Michx.: Berl.; Del., ubi cum nom. *Neetoux* quoque; Par.); *W. S. Moffatt*, swamps, Pine, Indiana, August 31, 1895 (Field); *Ch. Moré*, moist places, New Jersey, August, 1838 (Del., 2 sheets); *E. L. Mosely*, Marblehead Sandspit, Ohio, September 16, 1908 (Carn.); ex *herb. Nuttallii*, ex Massachusetts (Brit., sub nom. *C. coronata* L.); *F. W. Pennell* 3571, Parkdale, New Jersey, September 13, 1911 (Phila.); *idem* 6622, Point Pleasant, New Jersey, September 22, 1915 (Phila.); *J. E. Peters*, May's Landing, Atlantic Co., New Jersey, October 12, 1887 (N.Y.); *T. C. Porter*, Budd's Lake, New Jersey, September 19, 1878 (N.Y.); *J. T. Rothrock*, Spy Pond, Cambridge, Massachusetts, September 20, 1864 (Field); *P. A. Rydberg* 1642, sandhills, Middle Loupe River near Thedford, Nebraska, August 19, 1893 (N.Y.); *J. H. Sandberg*, Hennepin Co., Minnesota, August, 1889 (Penn.); *F. Scammon*, Chicago, Illinois, September, 1860 (N.Y.); *A. Schrader* 127, Ohio, 1864 (Berl.); *J. H. Schuette*, Cedar Swamp, Green Bay Marsh, Wisconsin, August 17, 1878 (Field); *Charles Shäffer*, Spotswood Dam, New Jersey, September 18, 1871 (Phila.); *E. E. Sherff* 1747, ditch, South Chicago, Illinois, August 24, 1912 (Mo.); *idem* 1997, wet soil, near Carpenterville, Illinois, September 22, 1912 (Field); *E. F. Shipman*, Benton Co., Indiana, August, 1876 (Phila.); *C. W. Short*, banks of Ohio River, Fernbank, Ohio (Kew); *idem*, rich soils, Lexington, Kentucky, 1835 (Kew; forma nonnullis foliis tripartitis ac foliolis 1.5–1.8 cm. latis); *idem*, marshes around Louisville, Kentucky, 1835 (Phila.) and 1840 (Phila.); *idem*, marshes, Kentucky, 1840 (Brit.); *Joseph Schrenk*, Weehawken, New Jersey, 1884 (Mo.); *Forrest Shreve*, fresh-water marshes of Choptauk River, Dover Bridge, Caroline Co., Maryland, September 16, 1907 (U.S.); *idem* 401, Charlestown, Maryland, September 12, 1904 (U.S.); *G. H. Shull* 356, north of Bush River Station, Maryland, September 10, 1902 (U.S.); *A. H. Smith, T. C. Porter, & J. Leidy*, Tinicum Isl., Pennsylvania, September 8, 1868 (Penn.); *Stewart*, Illinois (ex *herb.* Asae Grayi, Kew; forma achaeniis parvis *B. mitis* adpropinquans sed foliis typica pro *B. coronata* var. *tenuiloba*); *idem*, peat bogs, Peoria, Illinois, 1869

BIDENS EATONII Fern. (figs. *a–f*); var. FALLAX Fern. (fig. *g*)

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(Gray); *John Torrey*, New York, 1843 (Del.); *Frank Tweedy*, pine barrens, New Jersey, September, 1880 (Berl.; achaeniis plus minusve eis *B. mitis* adpropinquantibus); *L. M. Umbach* 2035, marsh, Clark, Indiana, September 2, 1907 (Mus. V.); *idem* 2051, marsh, Miller, Indiana, September 6, 1907 (Mus. V.); *E. G. Vanatta*, Queen Anne Co. (at point opposite Chestertown), Maryland, August 15, 1902 (Phila.); *idem*, Chestertown, Maryland, August 3, 1904 (Phila.); *George Vasey*, Ringwood, Illinois, 1861 (Gray); *Von Rabenau*, Arlington, Staten Isl., New York, September 7, 1890 (Berl.); *C. A. Weatherby*, open swamp, Wenham, Massachusetts, October 12, 1915 (N. Eng.); *W. C. Werner*, Cedar Swamp, Champaign Co., Ohio, September 10, 1892 (N.Y.); *H. E. Wetherill*, Norristown, Pennsylvania, 1891 (Penn.); *A. Wetzstein*, St. Marys, Ohio, September, 1898 (Berl.); *C. F. Wheeler*, swamp near Lansing, Michigan, July 23, 1897 (Gray); *W. F. Wight* 112*a* and 113, Kalamazoo River, Allegan Co., Michigan, September 11, 1902 (U.S.); *E. Wilkinson* 5126, Richland Co., Ohio, August 29, 1893 (Field); *idem* (similiter) 5126, low woods, Mansfield, Ohio, August 29, 1895 (Carn.); *C. S. Williamson*, Chicago, Illinois, September 2, 1898 (Phila.); *idem*, Philadelphia, Pennsylvania, August 23, 1903 (Phila.); *O. R. Willis*, Hightstown, New Jersey, September, 1845 (Field); *A. B. Wolcott* 75, low prairie south of dunes, Mineral Springs, Indiana, September 13, 1911 (Field); *H. A. Young*, Cedar Pond, Lynn, Massachusetts, September 13, 1879 (N. Eng.).

Britton, at the time of transferring several American species from *Coreopsis* to *Bidens*, assumed that this species had already been transferred by Fischer. In fact, as his citation proves, he rested his assumption entirely upon Steudel. But a careful examination of Steudel (Nom. Bot. ed. 2. 1840), with proper regard for his use of italics for synonyms, shows that Fischer's plant was *Coreopsis coronata* Hooker (a true *Coreopsis*) and not *Coreopsis coronata* L. Steudel even emphasized this fact with the words *nec alior.* after *C. coronata* Hooker, to which he referred *Bidens coronata* Fischer. Thus the Linnean species was left in *Coreopsis* until Britton's treatment of it as a species of *Bidens*.

In the Linnean Herbarium there still exists the original superb specimen of *Coreopsis coronata* L. (cf. Bot. Gaz. 59: 314, *fig. 3*. 1915; cf. pl. LIX, fig. *m*). It lacks mature achenes, but its several beautiful, 8-rayed heads, with the rays strikingly well arranged on the paper, leave little doubt that Linnaeus had this specimen at hand when describing his *C. coronata* (Sp. Pl. ed. 2. 2: 1281. 1763; "radio magno,

octopetalo," etc.).[1] While, indeed, Linnaeus cited in his synonymy plants of Vaillant and Plummier, these have been justly excluded by subsequent authors. Thus, for forming a true conception of *C. coronata* L., there are left the Linnean specimen and description. The latter, by itself, is inadequate. The former, in Gray's time, seemed likewise disappointing, as being too nearly intermediate between *C. mitis* Michx. (*C. aurea* Gray, non Ait.) and *C. trichosperma* Michx.[2] But, in later years, numerous specimens of these last two species have been added to our American herbaria and show very clearly differences in leaf outline that Gray, with his scantier material, evidently could not properly evaluate. A comparison with these specimens shows at once that the single remaining Linnean specimen is *Coreopsis trichosperma* Michx. and hence *Bidens trichosperma* (Michx.) Britt.[3]

We may remark also that Nuttall (loc. cit.) equated *C. trichosperma* Michx. with *Coreopsis coronata* L., for the concept of which latter he relied upon Gray ("fide Gray"), a fact which evidently indicates that in his earlier years Gray had considered *Coreopsis coronata* L. to be the species common in the northeastern United States (our *Bidens coronata*), not that found in the southeastern United States (our *Bidens mitis*).

[1] In fact, Asa Gray and various others appear to raise no question whatever as to the authenticity of this specimen and refer to it as "the specimen of the Linnean Herbarium" (a fact of importance if it be argued that the habitat, Pennsylvania—vide sub "Type Specimen"—is in conflict with Linnaeus' published habitat, Virginia).

According to Jackson's scholarly researches (Proc. Linn. Soc. 124th Session, suppl.—Index Linn. Herb.—: 8, sub num. 3; 25, sub Explanation; 62, sub Coreopside coronata, 3. 1912), the inscription *Cor. coronata* is in Linnaeus' own handwriting and the specimen was first "enumerated" by Linnaeus (as possessed in his private herbarium) by underscoring in the second volume of the twelfth edition of the *Systema Naturae*, published in 1767, thus proving its accession between the spring of 1755 and about or later than 1767.

[2] Dr. N. L. Britton wrote me in 1915 that, many years before, he had examined the Linnean type, but, while entertaining doubts as to its true status, felt constrained, for want of achenes, to follow Gray's treatment, except as to generic affiliations. Professor M. L. Fernald of the Gray Herbarium informed me shortly afterward that Gray's fragment at Gray Herbarium, from the Linnean Herbarium (where certain heads were missing on the single type specimen), showed "perfectly characteristic fruit of *B. trichosperma*, not of *B. coronata* of recent authors," thus confirming my conclusions in a most emphatic way.

[3] Gray (Syn. Fl. N. Amer. 1, pt. 2: 294. 1884) did equate, though somewhat provisionally, the *C. coronata* of the Linnean Herbarium with a species of the southeastern United States, *Bidens mitis* (Michx.) Sherff, which latter he erroneously called *Coreopsis aurea* Ait.

The type of *B. trichosperma* (Michx.) Britt. is still extant (Par.) and was studied in 1924; also the cotypes at Berlin (Berl.) and Geneva (Del.). The material matches the Linnean Herbarium *Coreopsis coronata* well.

Nuttall's herbarium (Brit.) has a plant of *B. coronata* from Massachusetts. Its first determination, "*trichosperma* Michx.," had been crossed out and "C. coronata Linn." substituted.

Bidens coronata var. *β.* **tenuiloba** (Gray) Sherff, Bot. Gaz. 86: 446. 1928. Pl. LIX, figs. *n* and *o*.

Coreopsis trichosperma var. *tenuiloba* Gray, Syn. Fl. N. Amer. 1, pt. 2: 295. 1884.

Bidens trichosperma var. *tenuiloba* (Gray) Britt. Bull. Torr. Bot. Club 20: 281. 1893.

Bidens trichosperma var. *tenuifolia* (Gray) Britt. ex Farw. Ann. Rept. Comm. Parks and Blvds. Detroit 11: 92. 1900.

A specie caule saepe altiore, foliolis segmentisve angustissime linearibus et saepe etiam integris, achaeniis minoribus differt.

Type specimen: Collected by *George Vasey*, sloughs in northern Illinois, 1862 (Gray).[1]

Distribution: With the species proper and usually commoner.

Specimens examined: *E. P. Killip* 13273, Alsion, Atlantic County, New Jersey, September, 1928 (Field); also many specimens already listed with those of species proper (cf. p. 222, footnote 1).

Frequently, where many specimens are examined in the field, the var. *tenuiloba* is found to pass over into the species proper. The more finely divided foliage appears to be the most pronounced diagnostic character, but even this is inconstant. Rarely the achenes are exceedingly diminutive and then a strong approach is made to *Bidens mitis* (Michx.) Sherff, as noted by Gray (loc. cit.).

Farwell's plant, not seen by me, was referred with an interrogation to this variety. It was described as "a peculiar form found on Belle Isle [a pleasure island at Detroit, Michigan]. It has the outer linear involucral bracts twice longer than the inner and equal to the rays in length."

EXPLANATION OF PLATE LIX, FIGS. *m–u*

Bidens coronata, figs. *m*, *p–u*: *m*, flowering spray, ×0.61; *p*, exterior involucral bract, ×3.05; *q*, interior involucral bract, ×3.05;

[1] Gray mentioned no type but gave "Peat bogs, Indiana and Illinois, *Vasey, Stewart*, &c." Whence the first cited material, that collected by Vasey, may well be regarded as the type. Gray had at least two specimens by Vasey, the first from Ringwood, Illinois, in 1861, a plant with broader leaf segments and really of the species proper, hence to be excluded here; the second from northern Illinois, in 1862, a fine specimen with very narrow leaf segments, clearly the kind that inspired the name *tenuiloba*. The supplementary specimen by J. T. Stewart was collected in peat bogs at Peoria, Illinois, 1869. It is a fine, large, branched plant (Gray).

r, ray corolla, ×1.22; *s*, palea, ×3.05; *t*, disc floret, ×3.05; *u*, achene, ×3.05; *m*, almost entirely from the Linnean Hb. specimen regarded here as type, but in very small part from *Sherff* 2014, in Hb. Field; *p–u*, from *Sherff* 2014, ibid.

Bidens coronata var. *tenuiloba*, figs. *n*, *o:* cauline leaves, ×0.61; *n*, from *Sherff* 2044, in Hb. Field; *o*, from *Sherff* 2015, ibid.

81. **Bidens mitis** (Michx.) Sherff, Bot. Gaz. 81: 43. 1926.
Pl. LIX, figs. *a–l*.

Coreopsis mitis Michx. Fl. Amer. Bor. 2: 140. 1803.

Coreopsis trichosperma var. "*β. aurea?*" Nutt. Gen. 2: 180. 1818 (exclud. synon. Ait.).

Coreopsis arguta Pursh, Fl. Amer. Sept. 2: 567. 1814.

Coreopsis ambigua Nutt. Journ. Acad. Phila. 7: 75. 1834.

Diodonta mitis (Michx.) Nutt. Trans. Amer. Phil. Soc. ser. 2. 7: 360. 1841.

Diodonta leptophylla Nutt. loc. cit.

Diatonta leptophylla Nutt. ex Walp. Repert. 2: 615. 1843 (sphalm).

Diatonta mitis (Michx.) Nutt. ex Walp. op. cit. 614 (sphalm).

Coreopsis aurea var. *subintegra* Torr. & Gray, Fl. N. Amer. 2: 339. 1843.

Coreopsis aurea var. *leptophylla* Torr. & Gray, loc. cit.

Coreopsis aurea var. *incisa* Torr. & Gray, op. cit. 340.

Coreopsis heterophylla Bertol. Misc. Bot. 7: 43. 1848 (ex descript. et patria).

Coreopsis cuspidata Bertol. op. cit. 44 (ex descript. et patria).

Coreopsis Jasminifolia Bertol. loc. cit. (ex descript. et patria).[1]

Bidens coronata var. *leptophylla* (Nutt.) Mohr, Contr. U. S. Nat. Herb. 6: 808. 1901.

Bidens aurea var. *leptophylla* (Nutt.) Sherff, Bot. Gaz. 59: 316. 1915.

Leidon mite (Michx.) Shuttlw. ex Sherff. op. cit. 81: 44, footnote 20. 1926.

Bidens mitis var. *subintegra* (Torr. & Gray) Sherff in herb.

Bidens mitis var. *incisa* (Torr. & Gray) Sherff in herb.

Herba annua, plus minusve glabra; caule tenui, 3–10 dm. alto, obscure quadrangulato, ramoso. Folia petiolata petiolis 0.3–2 (–3)

[1] Professor Luigi Buscalioni, Director of the Royal Botanical Garden of the University of Bologna, informs me (in lit., October 24, 1931) that *C. heterophylla* Bertol., *C. cuspidata* Bertol., and *C. Jasminifolia* Bertol. are not represented in the Bertoloni Herbarium at the University of Bologna, and that perhaps they are still in the hands of Bertoloni's heirs. Cf. footnote under *Bidens canescens*.

BIDENS ARISTOSA (Michx.) Britt. (fig. *h*); var. MUTICA Gray *ex* Gatting. (figs. *a–g*); var. FRITCHEYI Fern. (fig. *i*)

BIDENS POLYLEPIS Blake (figs. *k–r*); var. RETRORSA Sherff (fig. *s*)

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cm. longis, petiolo adjecto 0.4–1.2 dm. longa, membranacea, variabilia; nunc indivisa, lanceolata vel ovata, serrata, apice acuta vel acuminata (var. *subintegrae*); nunc integra vel saepius pinnata 3–7-partita foliolo terminali plerumque elongatissimo, lamina segmentisve linearibus et plerumque integris (formae plus minusve typicae) vel latioribus inciso-serratisque (var. *incisae*), rarissime valde pinnato-decomposita. Capitula radiata, pansa ad anthesin 2–5 cm. lata, pedunculata pedunculis tenuibus 0.2–1.2 dm. longis. Involucrum basi glabrum vel sparsim hispidum; bracteis exterioribus 7–10, linearibus vel lineari-spathulatis, saepius ciliatis, apice acutis obtusisve, 5–10 mm. longis, interiores saepe superantibus. Flores ligulati circ. 8, aurei, ligula 1–2.5 cm. longi, oblanceolati vel elliptico-obovati, apice integri vel minime denticulati. Achaeniorum 2 facies unicostatae; corpore subplano vel parce trigono, late cuneato, nigro, saepe rugoso aliter fere glabro, ad apicem dentibus acribus circ. 0.5–1 mm. longis et antrorsum setosis bidentato, 2.5–4.5 mm. longo.

Type specimen: Collected by *André Michaux* in North America (Par.).

Distribution: Southeastern United States from Maryland to Texas, but chiefly in coastal states from North Carolina to Louisiana. Apparently found once in Cuba (*Rugel* 633), where doubtless adventive.

Specimens examined: *Andrew Allison* 46, vicinity of Lake Charles, Louisiana, 1904 (U.S.); *Baldwyn*, Georgia (type of *Diodonta leptophylla* Nutt.; Brit.); *H. C. Benke* 3843, Palatka, Florida, March 10, 1924 (Field); *Chapman*, Florida (Kew); *idem*, Florida, 1845 (Brit., 2 sheets; uno specimine cum foliis pro maxima parte lanceolatis, alio cum foliis valde dissectis); *Cooper*, Alabama (type of *Coreopsis ambigua* Nutt.; Brit.); *A. H. Curtiss*, Eden, Georgia, 1875 (U.S.); *idem*, Walton Co., Florida, 1885 (N.Y.); *idem* 1472, near Jacksonville, Florida, October (Berl.; Brit.; Carn.; Field.; Gray; Kew; Mo.; Phila.); *idem* 4486, eodem loco, September 30, 1893 (N.Y.); *idem* 5322, swampy places in pine barrens, eodem loco, October 22, 1894 (Boiss.; Field; Kew); *Drummond*, New Orleans, Louisiana, 1832 (Kew); *idem*, Louisiana, 1832 (N.Y.); *idem*, eodem loco, 1833 (Kew); *idem*, Jacksonville and Covington, Louisiana, 1832–1833 (Brit.); *A. P. Garber*, Levy Co., Florida, November, 1877 (Field, 2 sheets; Phila.); *Gates*, Alabama, 1831 (N.Y.); *E. J. Grimes* 4546, banks of canal, Wallacetown, Virginia, October 2, 1921 (N.Y.); *Josiah Hale*, Louisiana (Phila., 3 sheets); *R. M. Harper* 1562, Satilla River swamp near Woodbine, Georgia, August 23, 1902

(Berl.; Brit.; Field; Mo.); *A. S. Hitchcock* 915, vicinity of Eustis, Florida, June–July, 1894 (Field); *idem* 917, Lake City, Florida, June–July, 1898 (Field); *idem* 918, Hernando Co., Florida, June–July, 1898 (Field); *O. E. & Grace K. Jennings*, flood plain of Peace River, vicinity of Fort Meade, Florida, December, 1919 (Carn., 3 sheets; forma foliis parvis indivisisque, nunc rhomboideis nunc rhomboideo-lanceolatis nunc oblongo-lanceolatis); *J. F. Joor*, Long Beach, Mississippi, September 16, 1891 (Mo.); *A. B. Langlois*, Côtes Blanches, Louisiana, October 10, 1884 (N.Y.); *E. A. Mearns*, Kissimmee, Florida, May 7, 1901 (U.S.); *Marie Meislahn* 107, Clarcona, Florida, November 5, 1899 (U.S.); *Michaux*, North America (type, Par.: cotypes, Berl.; Par.); *Charles Mohr*, Mobile, Alabama, October, 1878 (U.S.); *idem*, borders of ponds and streams in the low country, eodem loco, October 4, 1886 (U.S.); *idem*, Poplarville, Mississippi, October 4, 1894 (U.S.); *idem*, Mobile, Alabama, October, 1899 (U.S.); *G. V. Nash* 112, swamps, vicinity of Eustis, Florida, March 12–31, 1894 (Phila.); *idem* 150, eodem loco et tempore (Berl.; N.Y.); *idem* 336, eodem loco, April 1–15, 1894 (Berl.; Field; Kew; Par., 2 sheets); *L. B. Ohlinger* 400, marsh, Polk Co., Florida, May 12, 1894 (Field); *Edward Palmer* 285, Indian River, eastern Florida, 1874 (U.S.); *B. H. Patterson*, Orlando, Florida, December 3–11, 1917 (Carn., 2 sheets); *idem*, Kissimmee, Florida, December 7, 1917 (Carn.); *Rafinesque* (labeled "Appalachian Mts. in Alabama"; Petrop.); *F. Rugel*, near St. Marks, Florida, August, 1833 (Field); *idem* 278, swamps, Macon Co., North Carolina, September, 1842 (appellata *Leiodon aureum* Shuttlw.; Brit.; Kew); *idem* 360, meadows of Swannanoa (Swanano) Valley, North Carolina, August, 1841 (Berl.; Brit., 2 sheets; Kew); *idem* 483, Florida, 1845 (N.Y.; U.S.); *idem* 547, Florida, 1845 (U.S.); *idem* 633, Cuba (!),[1] 1849 (Brit.); *Forrest Shreve & W. R. Jones* 1304, marshes of Nanticoke River near Vienna, Maryland, August, 1906 (U.S.); *J. D. Smith* 16, swamps of Muddy Creek, North Carolina, August, 1881 (N.Y.); *P. C. Standley & H. C. Bollman* 10274, swamp, vicinity of Black Mountain, Buncombe Co., North Carolina, September 2, 1913 (U.S.); *S. M. Tracy* 4762, Biloxi, Mississippi, September–October, 1898 (Field); *idem* 6445, eodem loco, October 8, 1899 (Brit.; Gray; U.S.); *idem* 6929, Clearwater, Florida, April 20, 1900 (Mo., pro nova specie *Coreopsidis* a E. L. Greeneo habita); *idem* 7140, Bradentown, Florida, October 26, 1900 (Carn.; Field); *idem* 7351, Manatee, Florida, December 5, 1901 (Carn.); *L. F. &*

[1] The label is a printed one and so "Cuba" is perhaps correct. The species does not ordinarily grow there, however.

Rosamond Ward, Jacksonville, Florida, February–March, 1891 (U.S.); *Otto Westerlund* 10, Pittman, Florida, November, 1889 (U.S.); *C. S. Williamson*, Palatka, Florida, April, 1897 (Phila.); *S. H. Wright*, Volusia Co., Florida (Field).

As stated in a former paper (Bot. Gaz. 81: 43. 1926), the name *Bidens aurea* (Ait.) Sherff, at first considered as pertaining to a species from the southeastern United States, has been found to belong to the Mexican species described by Ortega as *Bidens heterophylla*. Michaux's name *Coreopsis mitis* is found to be, in reality, the first name published for the southeastern United States species, which is the species to be considered here. Torrey and Gray (loc. cit.) divided this species into three varieties, *subintegra*, *leptophylla*, and *incisa*, on the basis of the amount of leaf division. But in this species the variation in leaf division is so fickle that the maintenance of varieties is often difficult. Thus, in a considerable number of cases, a specimen in one herbarium belongs to one variety and one or more duplicates in other herbaria belong to another variety. Michaux (or rather, to speak more accurately, his author, Richard) described the leaves but scantily ("foliis petiolatis; infimis duplicato-pinnatifidis; supremis lineari-tripartitis"). I have studied specimens of his original material (Berl., ex Kunthio, cui datum erat ab A. Ricardo, anno 1827; Par., ex herb. Drake ex herb. A. Richard e Michx. ips.). Their leaf segments are slender and fit the var. *leptophylla* better than the var. *incisa*, to which latter Torrey and Gray referred the Michaux material.

This being the case, it becomes evident that, if varietal distinctions are to be erected, the species proper may be considered as embracing the plants with compound foliage and linear leaf divisions, leaving the various other foliage forms to constitute two more or less intergrading varieties, *subintegra* (Torr. & Gray) Sherff and *incisa* (Torr. & Gray) Sherff. The var. *subintegra* will include forms with leaves undivided (and ovate to lanceolate) or tripartite (with ovate to lanceolate leaflets). The var. *incisa* will include forms with the leaves more dissected, a specimen by Chapman (Florida, 1845; Brit.) having its multisect leaves looking even like the fronds of some ferns.[1]

[1] Of the specimens cited for *Bidens mitis*, the following are fairly typical, as to linear leaf divisions, of the species proper: *Baldwyn; Chapman* (Kew); *Curtiss* 1472 (Carn., pro parte; Field; Mo.); *idem* 4486; *Drummond*, in 1832 (Kew) and 1833 (Kew, 1 of 2 sheets); *Garber* (Field, 1 of 2 sheets); *Harper* 1562; *Hitchcock* 915; *Joor; Michaux; Mohr*, in 1878; *Ohlinger* 400; *Rugel* 483 (N.Y.); *Shreve & Jones* 1304; *Tracy* 6445 (Brit.); *Westerlund* 10.

Coreopsis ambigua Nutt. is represented by the type, still extant (Brit.). It is the form described by Torrey and Gray as var. *subintegra*.

Leidon mite (Michx.) Shuttlw. was the name printed on Rugel's label for a specimen of this species (Berl.), with *Coreopsis mitis* Michx. cited as a synonym. The generic name was more properly spelled on various other herbarium labels, *Leiodon*. Similarly, the name *Leiodon aureum* Shuttlw. was printed upon some of Rugel's labels (No. 278) and distributed for this species.

Nuttall's "*Coreopsis trichosperma* var. β. *aurea?*" was correctly referred by me (in my mss.) several years ago to this species (*B. mitis*). The plate in Edwards' *Botanical Register* (no. *1228*), is of *B. coronata* (L.) Britt. This plate was made in April, 1829, and based upon more northern material than *B. mitis* (Mr. Thomas, New York).

EXPLANATION OF PLATE LIX, FIGS. *a–l*

Bidens mitis: a, flowering spray, ×0.61; *b–e*, diverse cauline leaves, ×0.61; *f*, exterior involucral bract, ×3.05; *g*, interior involucral bract, ×3.05; *h*, ray corolla, ×1.22; *i*, palea, ×3.05; *j*, disc floret, ×3.05; *k*, *l*, achenes, ×3.05; *a*, *f–k*, from *Curtiss* 1472, in Hb. Field; *b*, *c*, from *Mr. Cooper*, Alabama (type of *Coreopsis ambigua* Nutt.), in Hb. Brit.; *d*, from type of *Diodonta leptophylla* Nutt., in Hb. Brit.; *e*, from *Rugel* 547, in Hb. Mo.; *l*, from *A. B. Langlois*, southern Alabama, in Hb. Field.

82. **Bidens Oerstediana** (Benth. ex Oerst.) Sherff, Bot. Gaz. 80: 385. 1925. Pl. LX.

Coreopsis Oerstediana Benth. ex Oerst. Vid. Meddel. Kjøbenh. 1852: 93. 1852.

Herba annua, glabra, erecta; caule tereti, moderate ramoso, ± 6 dm. alto. Folia tenuiter petiolata petiolis usque ad 4 cm. longis, petiolo adjecto usque ad 9 cm. longa, pleraque pinnatim 5-secta foliolis inferioribus plerumque 2–3-sectis, omnibus angustissimis (0.5–1.2 mm. latis) eciliatis et apice acutis. Capitula tenuiter pedunculata pedunculis usque ad 10 cm. longis, radiata, pansa ad anthesin 1.5–2 cm. lata et 0.7–1 cm. alta. Involucri bracteae biseriales, exteriores circ. 7–10, lineares, apicem versus plus minusve dilatatis, ad apicem subobtusae, tantum 1–2 mm. longae; interiores lanceolatae, 4–7 mm. longae, saepe ad medium reflexae. Paleae superne elongatae et sensim attenuatae, bracteis interioribus longiores. Flores ligulati 8–10, aurei, ligula oblongo-elliptici. Achaenia

solum immatura visa, non vere alata, brunnea, obcompressa, linearilanceolata, inferne latiora, superne longe angustata, faciebus paucistriata et glabra vel ad costam moderate hispida, margine erecte ciliata, corpore 3–4 mm. longa, apice erecto-hispida et biaristata aristis antrorsum et breviter sed dense hispidis, 2–3 mm. longis.

Type specimen: Collected by *Anders Sandöe Oersted*, No. 181, in savannahs on northeast slope of Mt. Masaya, Nicaragua, 1851 (Kew).

Distribution: Known only from the type locality in western Nicaragua.

Specimens examined: *Oersted* 181 (type, Kew).

This species from Nicaragua[1] was collected by Oersted on Mt. Masaya in the year 1851. It does not appear to have been collected since then. In fact, the region round Masaya has been explored botanically very little. The type specimen at Kew[2] is a slender, herbaceous plant, quite unlike the fruticose species so commonly found in Mexico and Central America for true *Coreopsis*. Bentham's original description likened it to some species of *Bidens*, but withheld it from *Bidens* because of the upwardly barbed achenial aristae. The young achenes were described as "subalata." The type specimen, though slightly immature in its achenes, is a plant related to *Bidens coronata* (L.) Britt. (*B. trichosperma* Michx.), of the northeastern United States. Its achenes are not more plainly margined or subwinged than the average *Bidens* achenes of similar stage of maturity.[3]

EXPLANATION OF PLATE LX

Bidens Oerstediana: flowering specimen, ×0.67; *b*, exterior involucral bract, ×5.38; *c*, interior involucral bract, ×5.38; *d*, ray floret, ×5.38; *e*, palea, ×5.38; *f*, disc floret, ×5.38; *g*, very immature achene, ×5.38; all from type.

83. **Bidens discoidea** (Torr. & Gray) Britt. Bull. Torr. Bot. Club 20: 281. 1893. Pl. LXI.

Coreopsis discoidea Torr. & Gray Fl. N. Amer. 2: 339. 1842.

Bidens tenuissima Greene Leafl. Bot. Observ. and Crit. 1: 200. 1906.

Bidens tenerrima Greene ex Sherff, Bot. Gaz. 56: 494. 1913.

[1] Not Brazil, as stated in the *Index Kewensis*.

[2] The Oersted plants in the Herbarium of the University of Copenhagen, from which Dr. Carl Christensen generously loaned me the material of *Bidens* and *Coreopsis*, do not appear to have among them a duplicate of this species.

[3] Dr. Sidney F. Blake, of the United States Bureau of Plant Industry, has kindly examined the type and likewise concluded that the plant was closer to *Bidens* than to *Coreopsis*.

Herba annua, erecta, glabra, 0.3–1.8 m. alta; caule purpurascenti, obtuse tetragono, diffuse ramoso. Folia membranacea, petiolata petiolis tenuibus 1–4 cm. longis, petiolo adjecto 0.5–1.2 dm. longa, tripartita, foliolis lanceolatis vel ovato-lanceolatis, acuminatis, serratis, omnibus plerumque petiolulatis, interdum obscure ciliatis. Capitula numerosa, discoidea, parva, disco demum 7–9 mm. lato et 6–7 mm. alto. Involucrum glabrum; bracteis exterioribus 3–5 (plerumque 4), foliaceis, lineari-spathulatis, membranaceis, non evidenter ciliatis, plerumque discum superantibus, 0.7–2.5 cm. longis; interioribus oblongo-lanceolatis, membranaceis, discum subaequantibus. Flores tubulosi 5-lobati. Achaenia subnigra, subplana, lineari-cuneata, saepe tuberculata, piloso-hispida, corpore 3–6.2 mm. longa, biaristata aristis 0.2–2.2 mm. longis, aristis marginibusque erecto-hispida.

Type specimen: Collected by *William Starling Sullivant*, No. 52, Columbus, Ohio, 1839 (N.Y.).

Distribution: Northern Nova Scotia, southern Quebec, and Minnesota southward to District of Columbia, Alabama, Louisiana, and Texas.

Specimens examined: *S. F. Blake* 2985, Maquam Bay, Swanton, Vermont, August 20, 1911 (N. Eng.); *A. E. Blewitt* 1103, shore of Lake Quassapaug, Middlebury, Connecticut, September 18, 1908 (N. Eng.); *idem* 1148, swamp, Waterbury, Connecticut, August 23, 1910 (N. Eng.); *O. H. Brown* 112, swamp, Cold Spring, New Jersey, September 10, 1914 (Phila.); *Stewardson Brown*, Budd's Lake, New Jersey, 1894 (Phila.); *W. M. Canby*, sandy river shores, Salisbury, Maryland, August (Kew); *idem*, Salisbury, Maryland, September, 1865 (Field); *Carpenter*, low land and water, Feliciana, Louisiana, July (N.Y.); *J. R. Churchill*, Lakeville, Long Island, New York, September 25, 1899 (Gray); *John Clayton*, Virginia, 1734, etc. (Brit., two sheets); *Collins & Fernald* 11460, Moscow Pond, Hopkinton, Rhode Island, September 3, 1914 (N. Eng.); *F. V. Coville*, Ithaca, New York, September 27, 1884 (Kew; U.S.); *Joseph Crawford*, Tullytown, Pennsylvania, September 12, 1894 (Phila., 3 sheets); *Mary A. Day & M. L. Fernald* 49, wet margins of pools, Neponset Meadows, Dedham, Massachusetts, September 6, 1901 (Berl.; Boiss.; Brit.; Can.; Del.; Field; Kew; Mus. V.; Par.; Phila.; U.V.); *C. C. Deam*, ditch, Steuben Co., Indiana, September 11, 1904 (Gray); *idem* 630, southeast of Montpelier, Indiana, September 24, 1905 (Deam); *Delzie Demaree* 13756, old bogs, Yorktown, Bayou Bartholomew, Lincoln Co., Arkansas, September 20, 1936 (Field); *idem* 13793,

swamp 3 miles west of McGehee, Desha Co., Arkansas, September 26, 1936 (Field); *idem* 13895, edge of Wilson Lake, Ashley Co., Arkansas, October 11, 1936 (Field); *idem* 13960, on logs in Bayou Bartholomew, Jefferson Co., Arkansas, October 11, 1936 (Field); *C. K. Dodge*, near Port Huron, Michigan, August 28, 1895 (Gray); *T. Drummond* 203, San Felipe, Texas, 1834–1835 (Kew; Oxf.); *idem* 268 pro parte, St. Louis, Missouri (Kew); *idem* 553, New Orleans, Louisiana (Kew); *George Engelmann*, St. Louis, Missouri, September, 1846 (Par.; Phila.) and 1858 (Berl.); *H. Eggert*, along Mississippi River near East St. Louis, Illinois, September 6, 1874 (Gray); *N. C. Fassett* 2876, floating dock, Minneiska, Minnesota, September 6, 1926 (N.Y.); *idem* 2878, floating dock, Winona, Minnesota, September 11, 1926 (N.Y.); *M. L. Fernald & B. Long* 10673, Lakeville, Massachusetts, August 26, 1913 (Phila.); *iidem* 17597, Brewster, Massachusetts, September 7, 1918 (Phila.); *iidem & G. S. Torrey* 10674, swampy thickets near head of Harbor Pond, Block Isl., Rhode Island, September 13, 1913 (Gray; Phila.); *C. D. Fretz*, Bristol, Pennsylvania, September 14, 1886 (Phila.); *A. P. Garber*, vicinity of Easton, Pennsylvania, 1868 (Field) and July, 1869 (Phila.); *J. M. Greenman* 2143, Beaver Pond, Lincoln, Massachusetts, August 23, 1903 (Mo.); *Josiah Gregg*, above Shreveport, Louisiana, September 28, 1847 (Phila.); *J. V. Haberer* 1458, gravelly, inundated shore of Oneida Lake at Davis Point, Lenox, New York, August 2, 1906 (U.S.); *idem* 3359, gravelly, inundated shore of Oneida Lake at Jewel, New York, August 27, 1905 (U.S.); *Hale*, Louisiana, 1842 (Gray); *idem* 402, eodem loco (N.Y.); *E. B. Harger* 4833 p.p., wooded swamp, Long Hill, Connecticut, August 25, 1905 (N. Eng.); *A. A. Heller & E. G. Halbach* 601, about Long Pond, Luzerne Co., Pennsylvania, September 16–17, 1892 (Field; Phila.); *Heuser*, Rahway, New Jersey, 1865 (Calif.); *G. W. Letterman*, alt. 90 meters, edge of swamp, Texarkana, Arkansas, October 19, 1894 (N.Y.); *Lindheimer*, swamps, Houston, Texas, October, 1842 (Gray); *C. D. Lippencott*, Budd's Lake, New Jersey, September 4, 1894 (Phila.); *John Macoun*, McKay Lake, Ottawa, Ontario, August 3, 1911 (Can.); *Marie-Victorin* 8197, Ottawa Co., Quebec, September 1, 1919 (Par., 2 sheets); *A. H. McKay*, on beaches, Pictou, Nova Scotia, September, 1875 (N.Y.); *C. Mohr*, swampy thickets, Alabama, October 18, 1896 (U.S.); *E. L. Moseley*, on floating log, cove of Sandusky Bay, Ohio, September 12, 1895 (Carn.; Field); *H. N. Patterson* 382, Oquawka, Illinois (Berl.); *A. S. Pease* 1371, Andover, Massachusetts, September 6, 1901 (N. Eng.); *T. C. Porter*, Delaware

River, near Easton, Pennsylvania, September 14, 1869 (Field; Par.; Phila.); *idem*, eodem loco, September 27, 1869 (N.Y.); *idem*, eodem loco, September, 1875 (Par., 2 sheets); *idem*, Easton, Pennsylvania, September 27, 1875 (Field); *idem*, Budd's Lake, New Jersey, September 15, 1875 (Phila.); *idem*, Delaware River, above Easton, Pennsylvania, October 1, 1886 (Phila.); *E. S. Steele*, vicinity of Washington, District of Columbia, September 7, 1899 (Del.); *W. S. Sullivant*, Columbus, Ohio, 1840 (Phila.) and very common in swamps, eodem loco, 1842 (Phila.); *idem* 52, eodem loco, 1839 (type, N.Y.); *S. M. Tracy* 8585, Saratoga, Mississippi, October 2, 1903 (type material of *Bidens tenuissima* Greene: Brit.; Mo.; Penn., etc.); *L. F. Ward*, Washington, District of Columbia, September 24, 1882 and October 3, 1880 (U.S.); *J. H. Wibbe*, Oswego, New York (Par.); *T. A. Williams*, Tacoma Park, District of Columbia, September 18, 1900 (Par.); *C. S. Williamson*, rocky shores of Green Pond, Morris Co., New Jersey, August 18 and 21, 1904 (Phila.); *idem* 2474, near Higbee's Beach, Cape May Co., New Jersey, September 22, 1912 (Phila.); *Charles Wright*, Connecticut (Carn.).

As previously pointed out (Bot. Gaz. 56: 494. 1913), Greene's *Bidens tenuissima*, termed *B. tenerrima* on the labels of the type collection, was originally described by Greene as "a gigantic ally of *B. connata* but with almost minute heads." His type and cotypes are merely tall, slender forms of *B. discoidea*.

Britton (loc. cit.) reports having observed downwardly barbed awns in this species. Wiegand (ibid. 26: 405. 1899), after having made a special study of the North American species of the section *Platycarpaea*, reported that he had never observed any retrorse barbs in *B. discoidea*. Nor do I recall having seen any.

EXPLANATION OF PLATE LXI

Bidens discoidea: a, flowering and fruiting specimen, ×0.63; *b*, exterior involucral bract, ×3.15; *c*, interior involucral bract, ×3.78; *d*, palea, ×3.78; *e*, disc floret, ×6.32; *f*, achene, ×4.42; *a–e*, from *Day & Fernald* 49, in Hb. Field; *f*, from *A. P. Garber*, vicinity of Easton, Pennsylvania, 1868, in Hb. Field.

84. **Bidens frondosa** L. Sp. Pl. 832. 1753. Pl. LXII, figs. *a*, *c–h*.

Bidens frondosa var. *α. major* Hook. Comp. Bot. Mag. 1: 99. 1835.

Bidens frondosa var. *β. minor* Hook. loc. cit.

Bidens melanocarpa Wieg. Bull. Torr. Bot. Club 26: 405. 1899.[1]

[1] *Bidens melanocarpa* f. *pumila* Lehmann, a printed name on label for *A. Lehmann* 5092, but which I have not yet seen in literature, is purely synonymous

BIDENS MITIS (Michx.) Sherff (figs. *a–l*)
BIDENS CORONATA (L.) Britt. (figs. *m*, *p–u*); var. TENUILOBA (Gray) Sherff (figs. *n*, *o*)

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Bidens fondosa L. ex Stone, Ann. Rept. N. Jers. State Mus. 1910: 773. 1910 (sphalm).

a. Achaeniorum aristae antrorsum hispidae.....var. *β. anomala.*

a. Achaeniorum aristae retrorsum hamosae.

b. Plantae glaucescentes.....var. *γ. pallida.*

b. Plantae virides.

c. Foliorum dentes lanceolato-attenuati, medii 5–6 mm. longi. var. *δ. stenodonta.*

c. Foliorum dentes latiores.....*B. frondosa* sensu stricto.

Herba annua, plus minusve glabra, paniculato-ramosa, 5–12 dm. alta, caule tetragona et plerumque purpurascens. Folia petiolata petiolis tenuibus 1–6 cm. longis, petiolo adjecto 0.5–1.5 (–2) dm. longa, pinnatim 3- vel 5-divisa, membranacea, ciliata, supra plerumque glabrata, infra glabrata vel obscure sparsimque vel etiam subvalde setis minutis vestita; foliolis lanceolatis, acuminatis, serratis, terminali tenuiter petiolulato. Capitula obscure ligulata vel interdum discoidea, ad anthesin circ. 1 cm. lata et 6 mm. alta. Involucrum ad basim hispidum; bracteis exterioribus (5–8) conspicue ciliatis, saepe longissimis (etiam 3–5 cm.) et foliaceis, lineari-spathulatis; interioribus ovatis vel ovato-lanceolatis, brevioribus (demum 5–7 mm. longis). Flores ligulati minuti (vel deficientes), aurei, 2–3.5 mm. longi, ligula cuneato-obovati, ad apicem plerumque 2–3-dentulati; tubulosi aurantiaci, 4–5-lobati. Achaenia plana, anguste cuneata, subnigra, subglabra vel piloso-hispida, corpore 6–10 mm. longa, faciebus valde 1-nervata, biaristata aristis retrorsum hamosis et 3–4.5 mm. longis.

Type specimen: No particular specimen was cited by Linnaeus. For more complete discussion see text below.

Distribution: Newfoundland, Nova Scotia, Prince Edward Island, Magdalen Islands, etc., to New Brunswick, thence across North America through Quebec, Ontario, Manitoba, and southern Saskatchewan to Washington, southward to District of Columbia, West Virginia, Arkansas, Louisiana, Texas, Colorado, and California; rarely southeastward to Florida; collected once in French Guiana (*Leblond* 331); in Europe established in Sicily, and in peninsular Italy at Lucca, Pisa, Florence, etc.; also in Germany (cf. Verh. Bot.

with *B. frondosa*. The plant is merely a dwarfed form (collected in Germany) and utterly unworthy of separate rank. So also for *B. melanocarpa* f. *simplex* Lehm. printed on label for *A. Lehmann* 5093.

Ver. Brandenb. 1896: lv. et ibid. 1897: 89); found once in Portugal (*Cunha* 1260).[1]

Specimens examined: *L. R. Abrams* 6758, 3–5 miles above Auburn, California, September 15, 1917 (N.Y.); *R. T. Anderson* 12562, Aylmer, Ontario, August 9, 1899 (Berl.); *C. R. Ball* 490, infrequent, in low ground, vicinity of Alexandria, Louisiana, May 29, 1899 (Can.; Gray); *Edwin B. Bartram* 1251, creek margin, Bradford Hills, Chester Co., Pennsylvania, October 2, 1910 (Gray); *idem* 1369, Valley Forge, Pennsylvania, October 16, 1910 (Phila.); *W. Behrendsen*, on floating wood, Potsdam, Germany, September 26, 1896 (Cop.); *idem* 4106, on floating wood, Havel River, near Potsdam, September, 1896 (Berl.; Boiss.; Del., 2 sheets; Mun.; Mus. V.; U.V.); *J. Boll*, Dallas, Texas, 1871 (Del., 2 sheets); *T. S. Brandegee* 706, Oil Creek, Fremont Co., Colorado, September, 1873 (Calif.); *H. E. Brown* 51, alt. 300 meters, vicinity of Pendleton, Oregon, August 30, 1896 (Del.); *A. B. Burgess* 305, creek bottoms, Prairie Rhonde, Michigan, September 25, 1903 (Field); *B. F. Bush* 167 pro parte, Jackson Co., Missouri, September 28, 1893 (Gray; Kew); *idem* 346, Swan, Missouri, September 24, 1899 (Gray); *idem* 809, Courtney, Missouri, September 11, 1899 (Gray); *R. Chalmers*, wet places, Campbellton, New Brunswick, July, 1877 (Can.); *idem*, swamps and ditches, eodem loco, August 17, 1884 (Gray); *E. B. Chamberlain* 437, Bristol, Maine, August 27, 1897 (N. Eng.); *Fred Clements* 2894, Lomo, Nebraska, August 18, 1893 (Gray); *Culbertson* (Distrib. *C. F. Baker*, No. 4651), Millwood, Fresno Co., California, October 4, 1904 (Del.; Field; Kew); *A. Ricardo da Cunha* 1260, margins of Rio Nabão, Thomar, Portugal, September, 1887 (Berl., 2 sheets; Boiss.); *J. A. Cushman* 1717, Spencer Bay, Piscataquis Co., Maine, August 25, 1907 (N. Eng.); *R. A. Dixon* 365, vicinity of Huntsville, Texas, July 9–12, 1909 (Field); *Alice Eastwood* 47, along Platte River, Denver, Colorado, August 18, 1910 (Gray; Kew); *A. D. E. Elmer* 611, Loomiston, Washington, August, 1897 (Berl.); *Fernald, Bissell, Graves, et al.* 22874, Sissiboo River, Weymouth, Nova Scotia, August 21, 1920 (Phila.); *Fernald & Collins*, Nouvelle, Bonaventure Co., Quebec, July 19–20, 1904 (Gray); *iidem & York* 11461, northeast of Sand Pond, Warwick, Rhode Island, September 8, 1914 (Phila.); *Fernald & Long* 14841, tidal mud flats at mouth of Souadabscook Stream, Hampden, Maine, September 11, 1916 (Cop.); *iidem* 22876, Third Lake, Windsor Junction, Nova Scotia, August 31, 1920

[1] A specimen by Abbón (Del.), purporting to come from Monterrey, State of Nuevo León, Mexico, is doubtless mislabeled (cf. Standley, Science n. ser. 65: 130. 1927).

(Phila.); *iidem* 24697, Harper Lake, Shelburne Co., Nova Scotia, August 5, 1921 (Phila.); *iidem & St. John* 8200, boggy margin of the strand at the Narrows, Alright Isl., Magdalen Isls., Quebec, August 21, 1912 (Gray); *iidem* 8201, swale along Hillsborough River, St. Andrews, Prince Edward Isl., August 26, 1912 (Gray); *Fernald, Long, & Torrey* 10675, border of pond hole, east of Great Salt Pond, Black Isl., Rhode Island, September 13, 1913 (Gray); *Fernald & Wiegand* 4150, Birchy Cove (Curling), region of Humber Arm, Bay of Islands, western Newfoundland, September 2, 1910 (Gray); *Adr. Fiori* 1377, Marsh of Fucecchio, Prov. Florence, Italy, September 20, 1909 (Gray);[1] *G. L. Fisher*, St. Thomas, Ontario, September 20, 1908 (U.V.); *J. Fowler*, Kingston Mills, Kingston, Ontario, September 12, 1899 (Field); *G. B. Grant* 5278, Mt. Shasta, California, September, 1902 (Calif.); *J. M. Greenman* 545, Gandy Creek, West Virginia, September 15, 1904 (Field); *idem* 1713, Tiverton, Rhode Island, September 27, 1903 (Gray); *idem* 1799, Cumberland, Rhode Island, September 13, 1903 (Gray); *R. Gross*, Köpenick on the Spree River, Prov. Brandenburg, Germany, October 3, 1908 (Mus. V.) and September 6, 1909 (Cop.) and September 22, 1909 (Berl.); *J. H. Grove* 619, New Egypt, New Jersey, September 15, 1907 (Phila.); *G. Guttenberg*, near Wheeling, West Virginia, September, 1878 (Carn.); *Josiah Hale*, Alexandria, Louisiana (N.Y.); *A. A. Heller* 10240 p.p., alt. 1,350 meters, farm near Reno, Nevada, September 21, 1910 (Berl.; Del.; Gray); *idem* 11134, Chico, on Big Chico Creek, California, September 12, 1913 (Berl.; Del.; Gray); *F. Hermann*, Bernburg, Anhalt, Germany, September 15, 1905 (Calif.); *A. F. Hill* 2357, Swans Isl., Hancock Co., Maine, August 17, 1915 (N. Eng.); *H. T. Holm*, low thickets, Brookland, District of Columbia, September, 1908 (Cop.); *J. H. Holmes*, Woodlawn, Virginia, August, 1888 (Field); *Hortus Cliffortianus* (Brit.); *Hortus Upsalensis* (Brit.); *O. E. Jennings*, Kittanning, Pennsylvania, September 24, 1904 (Carn.); *W. L. Jepson*, Grand Isl., Lower Sacramento River, California, September 17, 1891 (Penn.); *M. E. Jones* 620, alt. 1,800 meters, near South Boulder, Colorado, August 15, 1878 (Berl.); *Joh. Lange*, ditch near Lucca, Compartimento of Tuscany, Italy, September, 1861 (Cop.); *O. E. Lansing, Jr.*, 3540, Catlin, Illinois, September 27, 1912 (Field); *idem* 3693 and 3701, near brook, Deer Park Canyon,

[1] Label gives following note: "Oss.-Pianta originaria dell'America sett., ma ora talmente diffusa in parecchi luoghi paludosi della pianura toscana da presentarsi come specie affatto indigenata. La sua scoperta in Toscana data dal 1849, epoca nella quale il Caruel la rinveniva presso Firenze lungo la ferrovia di Prato; ma già sino dal 1860 era abbondante nei dintorni di Lucca e di Pisa. Adr. Fiori & A. Béguinot curant., Fl. Ital. Exsicc. Ser. II."

LaSalle Co., Illinois, September 6, 1914 (Field); *idem* 3800 and 3802, near road, Starved Rock, Illinois, September 7–8, 1914 (Field); *Leblond* 331, French Guiana, 1792 (Del.); *Alfred Lehmann*, alt. 100 meters, near Gundorf, Leipsic, Saxony, October 5, 1904 (Mus. V.); *idem* 5092, muddy ditches at Böhlitz-Ehrenberg near Leipsic, October, 1906 (Berl.; Cop.; Del.; Mun.; Mus. V.; U.V.; sub nom. *B. melanocarpa* f. *pumila*); *idem* 5093, eodem loco et tempore (Berl.; Cop.; Del.; Mun.; Mus. V.; U.V.; sub nom. *B. melanocarpa* f. *simplici*); *E. Levier*, vicinity of Florence, Italy, October 8, 1868 (Mus. V.; U.V., 2 sheets); *idem*, eodem loco, 1872 (Berl.; U.V.); *idem*, abundant in marshes about Lake Sibolla near Altopascio, Lucca, Italy, September 27, 1874 (Berl.; Gray; Mun.; Mus. V., 3 sheets); *idem*, marshes at Lake Sibolla, near Lucca, Italy, September, 1876 (Boiss.); *idem*, near Village of Brozzi west of Florence, Italy, October 20, 1887 (Mus. V.); *F. Lindheimer*, Industry, Texas, August, 1844 (Kew); *idem* 888, Texas, 1849–1851 (Berl.; Field); *C. G. Lloyd*, near Cincinnati, Ohio, September 18, 1882 (U.V.); *Bayard Long* 6903, Westville, New Jersey, September 22, 1911 (Phila.); *A. Ludwig*, floating wood, Potsdam, Germany, September 28, 1906 (Mus. V.); *J. M. Macoun*, borders of marshes, Selkirk, Manitoba, July 20, 1884 (Can.); *John Macoun*, moist places, Brackley Point Road, Prince Edward Isl., September 5, 1888 (Can.); *idem*, Medicine Hat, Saskatchewan, August 10, 1895 (Cop.); *idem*, in ditches by the brook, Morden, Manitoba, August 5, 1896 (Can.); *idem*, marshes at Springfield Junction, Nova Scotia, August 2, 1910 (Can.); *idem*, Chelsea Road, Hull, Quebec, August 11, 1911 (Can.); *W. R. Maxon* 5878, low, open woods, edge of swamp, vicinity of Lanham, Maryland, September 22, 1912 (Field); *H. B. Meredith*, Delaware River, Washington's Crossing, Pennsylvania, September 20, 1923 (Phila.); *E. D. Merrill* 529, East Auburn, Maine, July, 1895 (N. Eng.); *C. F. Millspaugh* 26, low ground, Miller, Indiana, September 22, 1900 (Field); *idem* 3880, roadside ditches, Lakeside, Berrien Co., Michigan, September, 1914 (Field); *idem* 3951, Ephraim, Wisconsin, September 20, 1915 (Field); *C. J. Moser*, Pennsylvania, August, 1832 (Del., 2 sheets); *Aven Nelson* 2749 p.p., Platte Canyon, Laramie Co., Wyoming, August 27, 1896 (Carn.); *idem* 8209, banks of irrigating ditches, Dry Creek, Colorado, August 25, 1900 (Kew); *idem* 8656 p.p., Platte Canyon, Wyoming, September 4, 1901 (Del.; U.S.); *J. C. Nelson* 4196, Hayden Isl. (opposite Vancouver, Washington), Oregon, October 8, 1921 (Field); *J. B. Norton* 280, wet places, Riley Co., Kansas, August 31, 1895 (Gray; U.V.); *L. H. Pammel* 84,

BIDENS OERSTEDIANA Sherff

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Ames, Iowa, September, 1909 (Gray); *idem* 3851, Charles City, Iowa, September 4, 1902 (Gray); *idem & C. R. Ball* 63 p.p., ledges, Boone Co., Iowa, August 22, 1896 (N.Y.); *Parlatore*, Palermo, Sicily (Del.); *Poeppig*, in wet meadows, Pennsylvania, August, 1824 (Del.); *H. W. Pretz* 11221, vicinity of Centre Valley, Pennsylvania, October 2, 1921 (Phila.); *Rafinesque*, North America, August, 1828 (Mus. V.; sub nom. *Bidente tripteridi*); *J. Reverchon* 519, moist places, Dallas, Texas, September, 1876 (U.V.); *Roberti*, ditches, Lucca, Prov. Lucca, Italy, August, 1876 (Berl., 2 sheets; U.V., 2 sheets); *B. L. Robinson*, Phillips, Maine, August 4, 1903 (Gray); *idem* 361, Jaffrey, New Hampshire, September 7, 1897 (Gray); *Rottenbach*, Rüdersdorf, Prov. Brandenburg, Germany, September 19, 1898 (U.V.); *H. E. Sargent* 76, Wolfboro, New Hampshire, August 17, 1909 (Gray); *P. Savi* 3627, ditches in vicinity of Lucques (Lucca), Italy, September, 1861 (Del.; Mus. V.); *F. C. Seymour* 8, Granville, Massachusetts, September 15, 1913 (Gray); *E. E. Sherff* 1871, West Pullman, Chicago, Illinois, August 30, 1912 (Field); *G. H. Shull* 400, in refuse, near Havre de Grace, Maryland, September 20, 1902 (Gray); *A. H. Smith* 59 p.p., Gray's Ferry, Philadelphia, Pennsylvania, September 22, 1866 (Phila.); *H. H. Smith* 6041, banks of Dairy Creek, Hillsboro, Oregon, August 7, 1915 (Field); *S. Sommier*, in marshes, Vicopelago near Lucca, Tuscany, Italy, October, 1874 (Field); *E. S. Steele*, vicinity of Washington, District of Columbia, September 17, 1896 (U.V.) and September 25, 1896 (Del.) and September 7, 1902 (Cop.); *Witmer Stone* 10803, Lawnside, New Jersey, September 7, 1908 (Phila.); *idem* 10907, Delanco, New Jersey, September 11, 1908 (Phila.); *W. N. Suksdorf* 1591, low, damp places, Columbia River, West Klickitat County, Washington, September 14, 1893 (Boiss.; Field); *Todaro* 1479, along brooks, Sicily, October (Berl.); *John Torrey*, State of New York, 1843 (Del., 2 sheets); ex *herb. Vaillantii* (Par.; sub nominibus postea pro synonymibus *Bidentis frondosae* a Linnaeo citatis); *A. C. Waghorne*, Newfoundland, September 3, 1896 (Del.); *W. F. Wright* 175, sandy bank of lake, Lake Edward, Quebec, August 24, 1904 (Gray; atypica, habitu *B. connatae* var. *fallaci* similis).

The original Linnean description of *Bidens frondosa*[1] is accompanied by two synonyms, the first one being "Bidens canadensis

[1] "*frondosa*. 4. Bidens foliis pinnatis serratis, seminibus erecto-distantibus calycibus frondosis, corollis radiatis. *Habitat in* America *septentrionali*. Folia *ternata aut ex* 5 *pinnata, supra glabra, striata, serrata*. Calyces *frondosi; radius in corolla brevissimus, saepe mutilatus*."

latifolia, flore luteo. Tournef. inst. 362;"[1] the second being "Chrysanthemum cannabinum bidens virginianum, caule erecto firmo subrubente. Moris. hist. 3. p. 17. s. 6. t. 5. f. 21." Wiegand (Bull. Torr. Bot. Club 26: 409. 1899), in trying to trace back the Linnean species, encountered "considerable difficulty." Finally he interpreted *B. frondosa* L. to be the plant later described by Greene as *B. vulgata*. For the *B. frondosa* of Linnaeus and of my text, he was left, then, apparently with no name, so he created the name *B. melanocarpa*. With Wiegand's conclusions, Greene (Pittonia 4: 246. 1901) took vigorous issue. As pointed out in a former paper (Bot. Gaz. 61: 498. 1916), Greene gave a good survey of pre-Linnean authors and their treatment of the plant finally named *B. frondosa* by Linnaeus. As additional evidence of the accuracy of Greene's conclusions regarding the characters of true *B. frondosa* L., there are the three specimens of Linnaeus' (Linn., 2 sheets; Herb. Hort. Cliff. in Brit.) and one of Vaillant's (Par.). The first of these has a flowering head with 9 or 10 elongate, foliose exterior involucral bracts (cf. Linn. loc. cit., "calycibus frondosis") and "HU 4, *frondosa*" is written on the sheet.[2] Pinned with this sheet is a second sheet having a plant without label, but which is coarser and has about 14 exterior involucral bracts on the largest head. The third specimen is among the Hortus Cliffortianus specimens and matches the first specimen, even to having the same elongate, foliose type of exterior bracts. Linnaeus clearly had the first or the third specimen, and probably both, in mind when he drew up his description of *B. frondosa* for the *Species Plantarum*. The second specimen is probably *B. vulgata* Greene, but it is not labeled, and has no historical significance. The fourth specimen is the one formerly in Vaillant's private herbarium. This matches the two labeled Linnean specimens perfectly. Bearing as it does, in Vaillant's own handwriting, the early names[3] afterward cited by Linnaeus as synonyms for *B. frondosa*, it shows that Vaillant, himself a student of the genus *Bidens*, likewise understood this species to be the smaller-headed, fewer-bracted, less robust form (and not the *B. vulgata* of Greene).

[1] In the third edition (1719), to which I have access, the page is 462, of vol. 1.

[2] Dr. B. Daydon Jackson, formerly of the Linnean Herbarium and known during the later years of his life as a Linnean authority of high rank, assured me that "HU" was used by Linnaeus to indicate that the plant had been raised "in Horto Upsalensi."

[3] I am indebted to Professor P. Danguy of the Museum of Natural History of Paris for comparisons made with Vaillant's known writing to verify the authenticity of these names. An extra label on the sheet "*Bidens frondosa* L." was written, according to Professor Danguy, by Lamarck.

BIDENS DISCOIDEA (Torr. & Gr.) Britt.

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Bidens frondosa var. β. **anomala** Port. ex Fern. Rhodora 5: 91. 1903; cf. Blake, ibid. 27: 34. 1925. Pl. LXII, fig. *i*.

Differt achaeniorum aristis antrorsum hispidis, non retrorsum hamosis.

Type specimen: Collected by *Aubrey Henry Smith*, banks of Delaware River, near Philadelphia, Pennsylvania, September and October, 1869 (Gray).

Distribution: Cape Breton Island and through Nova Scotia to Maine, thence southward near the Atlantic coast into District of Columbia; also in Iowa, Kansas, and Nebraska.

Specimens examined: *Anon.* (distrib. Univ. Montreal No. 28576), Berthier-en-bas, estuary of the St. Lawrence River, September 1, 1928 (Gray); *S. F. Blake*, along C. & O. Canal, near Cabin John, Maryland, October 5, 1924 (Gray); *idem* 8392, muddy shore, Analostan Isl., Washington, District of Columbia, September 14, 1921 (Field; Gray); *idem* 8680, vicinity of Cabin John, Maryland, October 21, 1923 (Field); *idem* 8839, Nantasket, Massachusetts, September 4, 1924 (N. Eng.); *Burk*, Gray's Ferry, Philadelphia, Pennsylvania, October, 1866 (Phila.); *idem*, Laurel Hill, Philadelphia, Pennsylvania, October, 1866 (Phila.); *W. M. Canby*, Wilmington, Delaware (Can.); *idem*, meadows, Brandywine, Delaware, August, 1867 (Field); *F. S. Collins* 3253, Orleans, Massachusetts, September 14, 1914 (N. Eng.); *Albert Commons*, tidal banks of Delaware River, near Wilmington, Delaware, October 8, 1875 (Kew); *N. C. Fassett*, Cherry Isl. Marsh, Wilmington, Delaware, September 16, 1899 (Phila.); *idem* 408, farmyard, Squirrel Isl., Boothbay, Maine, September 5, 1921 (N. Eng.); *M. L. Fernald & B. Long* 24698, gravelly sea beach, Yarmouth Bar, Nova Scotia, August 22, 1921 (Gray); *iidem* 24699, margin of thicket bordering cobbly beach of Parr Lake, Yarmouth Co., Nova Scotia, September 4, 1921 (Cop.; Phila.); *Fernald, Wiegand, & Eames* 14492, Narrows Isl., Black Lake, St. Lawrence Co., New York, August 30, 1922 (Gray); *iidem* 14494, limestone ledges of Lake Ontario, southwest of Chaumont, New York, August 27, 1922 (Gray); *Kate Furbish*, Brunswick, Maine, 1907 (N. Eng.); *Elihu Hall*, Kansas, 1869 (U.S.); *Hooker*, North America, 1835 (Del.); *C. D. Howe & W. F. Lang* 1466, dry soil, roadside, Purcell's Cove, Halifax Harbor, Nova Scotia, September 2–6, 1901 (Field; Gray); *iidem* 1527, sphagnous edge of swamp, eodem loco et tempore (Gray); *Bayard Long* 6895, vicinity of Newbold, Westville, New Jersey, September 22, 1911 (Phila.); *John Macoun*, St. Ann's Harbor, Cape Breton Isl., August 9, 1898 (Gray);

Marie-Victorin 21206, estuarine shores, Cap Rouge, Quebec, August 19, 1925 (Gray); *T. C. Palmer*, marshes of the Delaware River, Chester, Pennsylvania, September 9, 1896 (Gray); *L. H. Pammel & C. R. Ball* 63 p.p., on ledges, Boone Co., Iowa, August 22, 1896 (Field); *Rafinesque*, Arkansas (Del.); *P. A. Rydberg* 1707, Middle Loup River, near Thedford, Nebraska, August 26, 1893 (Berl.); *J. Rousseau* 21208, estuarine shores, Ile aux Oies, Quebec, August 26, 1925 (Gray); *idem* 21209, estuarine shores, Berthier-en-bas, Quebec, August 28, 1925 (Gray); *A. H. Smith*, banks of Delaware River, near Philadelphia, Pennsylvania (Kew); *idem*, eodem loco, September–October, 1868 (Berl.; Field) and September–October, 1869 (type, Gray); *C. E. Smith*, tidal mud of Delaware River, Tinicum, Pennsylvania (Gray; cum specie ipsa lecta sed distincta);[1] *H. K. Svenson & N. C. Fassett* 913, shores of Kennebecasis River, Lakeside, New Brunswick, August 25, 1923 (Gray); *iidem* 914, Restigouche River, Tide Head, New Brunswick, August 16, 1923 (Gray); *iidem* 915, tidal flats of St. Lawrence River, Levis, Quebec, August 9, 1923 (Gray).

Bidens frondosa var. γ. **pallida** Wieg. Rhodora 26: 5. 1924; cf. Sherff, Bot. Gaz. 80: 386. 1925.

Bidens melanocarpa var. *pallida* Wieg. Bull. Torr. Bot. Club 26: 406. 1899.

Parce glaucescens, ramis omnibus adscendentibus vel erectis, valde caulem principalem superantibus; foliis inferioribus ternatis, superioribus indivisis minoribus, in petiolis brevioribus (3–4 cm. longis) latius marginatis, glabris, non nitidis, venis inconspicuis; foliolis brevioribus, ovato-lanceolatis, brevi-acuminatis, grosse et acriter paucidentatis, terminali inferne in petiolulum alatum angustato; capitulis longioribus, in pedunculis longioribus; involucro exteriore erecto, foliaceo, quam capitulo 1–3-plo longiore, bracteis rariter ciliatis interioribus oblongo-lanceolatis; disci florum corolla majore (usque ad 3–4 mm. longa), saepe 4-dentata, propius lutea, quam aristis breviore; achaeniis corpore 5–10 mm. longis, non papillatis; aristis longioribus (quam corpore tantum circ. dimidio brevioribus).

Type specimen: Collected by *Brother Peter*, Halifax, Nova Scotia, in 1896 (N.Y.).[2]

[1] For remarks upon the significance of the upward direction of the hairs of the achenial awns see p. 20.

[2] At least Wiegand lists this first among his *specimens examined.* It is clear from his text, however, that he was influenced in his evaluation and description of this variety more by his field study of the abundant specimens growing along the shores of Cayuga Lake, near Ithaca, New York.

BIDENS FRONDOSA L. (figs. *a*, *c–h*); var. ANOMALA Port. *ex* Fern. (fig. *i*); var. STENODONTA Fern. & St. J. (fig. *b*)

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Distribution: Rare and known only from widely scattered localities in Nova Scotia, New York, Illinois, and (fide N. C. Fassettii in lit.) Wisconsin.

Specimens examined: *Brother Peter*, Halifax, Nova Scotia, 1896 (type, N.Y.); *John Wolf* 172, Illinois (Gray).

The var. *pallida* is rare in herbaria. Wiegand reports it as abundant in the vicinity of Ithaca, New York, along the shores of Cayuga Lake, "where its habit makes it quite conspicuous." I myself have not observed it growing.

"In many respects," says Wiegand (loc. cit.), "the reduction of the leaves and lengthening of the peduncles suggests a condition similar to that which in *B. connata* and *B. comosa* was determined to be a 'second growth,' but here the plants seem to be perfectly normal and healthy." While I should hardly have ventured to treat this form as worthy of varietal rank, any attempt to interfere with its status, in the absence of further field observations at least as careful and extended as those of Dr. Wiegand, would seem for the present unwarranted.[1]

Bidens frondosa var. *δ.* **stenodonta** Fern. & St. John, Rhodora 17: 22. 1915. Pl. LXII, fig. *b.*

Var. dentibus foliorum lanceolato-attenuatis, mediis 5–6 mm. longis; involucri bracteis exterioribus lanceolatis, acuminatis, plerumque 2.5–5 cm. longis.

Type specimen: Collected by *Merritt Lyndon Fernald* and *Karl McKay Wiegand*, No. 6375, boggy, open woods, Whitbourne, Newfoundland, August 8, 1911 (Gray).

Distribution: Prince Edward Island northeastward to Magdalen Islands and Newfoundland.

Specimens examined: *Fernald, Long, & St. John* 8199, boggy margin of a brackish pond southeast of Etang du Nord village, Grindstone Isl., Magdalen Isls., Quebec, August 15, 1912 (Gray); *iidem* 8202, border of salt marsh, Bunbury, Queens Co., Prince Edward Isl., August 9, 1912 (Gray); *Fernald & Wiegand* 6375 (type,

[1] Since the above remarks were written, Wiegand (Rhodora 26: 5. 1924) has published the following: "The taxonomic status of the plants included originally under this variety is not clear. They have the appearance of hybrids, also of ecological forms. Sporadic plants of this type still are found about Cayuga Lake." Still later (Wieg. & Eames, Fl. Cayuga Lake Bas. 419. 1926), he published (with Eames): "The leaves of var. *pallida* are apparently always smooth. As to characters, var. *pallida* might well be a hybrid of *B. frondosa* and *B. comosa*, but the restricted range of the variety near the lake shore does not support this assumption. This variety is of doubtful standing, and should be studied further."

Gray); *iidem* 6376, Norris Arm, Newfoundland, August 21–22, 1911 (Can.; Gray; Phila.).

EXPLANATION OF PLATE LXII

Bidens frondosa, figs. *a*, *c–h*: *a*, flowering and fruiting specimen, ×0.62; *c*, exterior involucral bract, ×1.87; *d*, interior involucral bract, ×1.87; *e*, ray floret, ×6.23; *f*, palea, ×1.87; *g*, disc floret, ×5.61; *h*, achene, ×2.49; *a*, *c*, *d*, *f*, *g*, *h*, from *Sherff* 1831 in Hb. Field; *e*, from *Millspaugh* 3824, ibid.

Bidens frondosa var. *stenodonta*, fig. *b*: leaf, ×0.62; from type.

Bidens frondosa var. *anomala*, fig. *i*: achene, ×2.49; from *A. H. Smith*, banks of Delaware River, 1868, in Hb. Field.

85. **Bidens vulgata** Greene, Pittonia 4: 72. 1899.
Pl. LXIII, figs. *a* and *c–h*.

Folia principalia pinnatim plerumque 3–5-partita.

Planta plerumque plus minusve glabrata..*B. vulgata* sensu stricto.

Planta plerumque valde perspicueque puberula..var. β. *puberula*.

Folia principalia bipinnata vel tripinnatisecta....var. γ. *schizantha*.

Herba annua, 0.3–1.5 m. alta; caule obtuse tetragono, saepe purpurascenti, plerumque plus minusve glabrato, ramoso ramis saepius fastigiatis. Folia petiolata petiolis tenuibus 1–5 cm. longis, petiolo adjecto 0.5–1.5 dm. longa, pinnata, plerumque 3–5-partita, plerumque fere glabra, foliolis lanceolatis, acuminatis, serratis, non perspicue ciliatis. Capitula inconspicue radiata, demum (bracteis exterioribus exclusis) 1.5–2.8 cm. lata et 1.2–1.8 cm. alta, pedunculata pedunculis tenuibus vel subvalidis, 0.4–2.3 cm. longis. Involucrum plus minusve hispidum, bracteis exterioribus 10–16, foliaceis, inaequalibus, lineari-spathulatis, hispido-ciliatis, demum 1–2 (–3) cm. longis; interioribus ovato-lanceolatis, demum 7–9 mm. longis. Flores ligulati minimi, flavidi, ligula obovato-lanceolati, infra sparsissime pilosi, 2.5–3.5 mm. longi; tubulosi flavi, 4- vel 5-lobati. Achaenia plana, obovato-cuneata vel oblongo-cuneata, brunnea vel olivacea, saepe tuberculata, duabus faciebus unicostata et glabra vel interdum breviter hispida, marginibus antrorsum setosa vel supra retrorsum hamosa, corpore 6–12 mm. longa, apice biaristata aristis retrorsum hamosis et 3–4.2 mm. longis.

Type specimen: No particular type was mentioned by Greene. The species was established by segregation from *Bidens frondosa* L.

Distribution: In North America from Nova Scotia to Quebec and Alberta southward to North Carolina, Missouri, Nevada, and California.[1] Introduced into Sicily and southern Italy.

Specimens examined:[2] *LeRoy R. Abrams* 12046, Blue Lakes, Lake Co., California, August 25, 1927 (Stanf.); *Anon.*, loco ignoto (Linn.); *A. L. Bakke*, vicinity of Forest City, Iowa, August, 1912 (Kew); *E. B. Bartram*, Devon, Pennsylvania, October 28, 1911 (Penn.); *M. S. Bebb* 363, Fountaindale, Illinois (Berl.); *Robert Bebb* 755, Tracy, Illinois, September 14, 1901 (Field); *S. F. Blake* 2843, shore of Missisquoi River, Swanton, Vermont, August 17, 1911 (N. Eng.); *idem* 3002, St. Albans, Vermont, August 22, 1911 (Phila.); *A. E. Blewitt* 1147, dry bank, Waterbury, Connecticut, August 27, 1910 (N. Eng.); *E. Bourgeau*, Saskatchewan, Canada, 1857–1858 (Berl.); *N. L. Britton*, Westport, New York, September 6, 1892 (N.Y.); *B. F. Bush* 808, common in woods, Courtney, Missouri, September 11, 1899 (Gray); *W. C. Cusick* 1768*a*, alt. 925 meters, Tules of Grand Ronde Valley, Oregon, August 9, 1897 (Gray); *C. K. Dodge* 143, near Port Huron, Michigan, August 25, 1904 (U.S.); *Drake & Dickson*, Portland, Oregon, September, 1886 (Field); *Drummond*, St. Louis, Missouri, 1832 (Kew); *idem* 238, eodem loco (Kew); *Hy. Edwards*, Sacramento, California, November 3, 1876 (N.Y.); *Fernald & Wiegand* 4151, bank of stream, Truro, Nova Scotia, September 11, 1910 (Gray); *Fernald, Hunnewell, & Long* 10676, vicinity of Chebacco Lake, Essex, Massachusetts, September 11, 1913 (N. Eng.; Phila.); *Fernald & Long* 14842, Hampden, Maine, September 11, 1916 (Phila.); *G. L. Fisher*, St. Thomas, Ontario, September 3, 1904 (U.V.); *idem* 11, eodem loco, September 17, 1905 (U.S.; U.V.); *F. F. Forbes*, Brookline, Massachusetts (cult. e seminibus ad Leeds, North Dakota lectis), August 25, 1907 (Del.); *Michel Gandoger* 1334, Naples to Capracotta, Italy, 1871 (Mo.); *F. C. Gates* 2194, roadside ditch east of Urbana, Illinois, October 14, 1907 (Gray, forma monstrosa achaeniis atypicis); *idem* 10083, yard, Carthage, Illinois, September 12, 1916 (Mo.); *E. B. Harger* 4160, Oxford, Connecticut, October 2, 1903 (Phila.); *A. A. Heller*, Lancaster, Pennsylvania, September 24, 1900 (Del.); *idem* 10240 p.p., alt. 1,350 meters, near Reno, Nevada, September 21, 1910 (U.S.); *R. M.*

[1] Field Museum has one specimen labeled as having been collected by Arsène, near the Prison, Morelia, Mexico, June, 1909. In view, however, of the deceptions known to have been practiced in connection with some of the plants bearing Arsène's name (cf. Standley, Science 65: 130. 1927), it is not safe to include Mexico in the distributional range.

[2] Including perhaps several plants that belong properly to var. *puberula*.

*Horner B*281, along streams, Wartsburg, Washington, August 20, 1897 (Gray); *Thomas Howell*, Sauvies Island, Oregon, October, 1886 (Par., forma abnormalis cum facie *B. comosae*); *M. E. Hyams*, Statesville, North Carolina (Carn.); *O. E. Jennings*, north of Glenshaw, Pennsylvania, October 13, 1918 (Carn.); *C. H. Knowlton*, Plymouth, New Hampshire, August 24, 1916 (Phila.); *F. O. Kreager* 527, Chewelah, Washington, August 26, 1902 (U.S.); *O. E. Lansing, Jr.*, 2626, old cornfield, Riverdale, Illinois, September 20, 1906 (Berl.; Field; Mus. V.); *idem* 3983 and 3992, vacant lots, Chicago, Illinois, September 28, 1915 (Field); *J. B. Leiberg* 916, Wallula, Oregon, September 17, 1894 (Berl.); *Bayard Long* 6782, Melrose, Pennsylvania, September 17, 1911 (Phila.); *idem* 6843, Ashbourne, Pennsylvania, October 7, 1911 (Phila.); *Martha L. Loomis* 587, beside railroad, Sherborn, Massachusetts, August 30, 1911 (N. Eng.); *Alexander MacElwee* 1526, roadsides along Perkiomen Creek, Sellersville, Pennsylvania, October 10, 1899 (Carn.); *John Macoun* (Herb. Can. No.) 10934, Ross Creek, Medicine Hat, Alberta, August 10, 1895 (Can.); *idem* (Herb. Can. No.) 21835, wet places, Algonquin Park, Ontario, August 16, 1900 (Berl.); *idem* (Herb. Can. No.) 60395, waste, cultivated ground, Wakefield, Quebec, August 28, 1903 (Can.); *W. R. Maxon*, moist roadside ditch, vicinity of Oneida, New York, August 26, 1895 (U.S.); *J. F. Macbride* 728, old neglected orchard, Falk's Store, Canyon Co., Idaho, August 14, 1910 (Carn.; Del.; Field); *idem* 1627, stream banks, Sweet, Idaho, August 14, 1911 (Del.; Gray); *E. A. Mearns* 158, Fort Snelling, Minnesota, September 4, 1889 (U.S.); *H. B. Meredith*, vicinity of Palatine, New Jersey, October 16, 1923 (Phila.); *Aven Nelson* 2749 p.p., Platte Canyon, Wyoming, August 27, 1896 (Gray); *idem* 8656 p.p., margins of marshes, eodem loco, September 4, 1901 (Boiss.; Gray); *W. H. Over* 5146, moist places, Clay Co., South Dakota, September 7, 1914 (U.S.); *L. H. Pammel* 19, Ames, Iowa, September, 1904 (Gray); *P. E. Pierron*, Westmoreland Co., Pennsylvania, September 7, 1877 (Cop.); *H. W. Pretz* 9112, near Allentown, Pennsylvania, September 8, 1917 (Phila.); *idem* 10513, vicinity of Wescoesville, Pennsylvania, September 19, 1920 (Phila.); *B. L. Robinson* 557, alt. 400 meters, open roadside gutters, Ringville, Massachusetts, August 17, 1912 (Gray); *Sandberg, MacDougal, & Heller* 914, Spokane, Washington, August 17, 1892 (U.S.); *E. P. Sheldon*, Lake Benton, Minnesota, August, 1891 (Field); *E. E. Sherff* 1830, moist prairie, Chicago, Illinois, August 30, 1912 (Field); *E. C. Smith* 537, roadsides and woods, Hinsdale, Illinois, September

9, 1902 (Field); *H. H. Smith* 6064, Chicago, Illinois, September 18, 1914 (Field); *P. C. Standley* 5614, alt. 900–1,500 meters, open slope, vicinity of Eagles Nest near Waynesville, North Carolina, September 7, 1910 (U.S.); *idem* 9006, oak woods, vicinity of Springfield, Missouri, August 20, 1912 (U.S.); *idem* 9308, vicinity of Ash Grove, Missouri, August 24, 1912 (U.S.); *idem* 9816, thin woods, vicinity of Rogersville, Missouri, September 3, 1912 (U.S.); *E. S. Steele*, vicinity of Washington, District of Columbia, October 2, 1902 (Cop.); *idem & uxor* 215, alt. 550 meters, Sweet Springs, West Virginia, September 5, 1903 (Gray); *W. N. Suksdorf* 1591, low damp places along Columbia River, West Klickitat Co., Washington, September 14, 1893 (Gray); *Augustino Todaro*, Palermo, Sicily, Italy, 1840 (Berl.); *C. A. Weatherby* 2071, sandy bank of Connecticut River, East Windsor, Connecticut, September 30, 1906 (N. Eng.); *K. M. Wiegand* 916, damp ditch, Truxton, New York, September 6, 1909 (Gray); *E. Wilkinson* 4874, Mansfield, Ohio, September 6, 1895 (Carn.); *C. S. Williamson*, Lake Manawa, Iowa, August, 1898 (Phila.); *idem* 2223, Fort William, Ontario, August 12, 1912 (Phila.); *idem* 2326, eodem loco, August 21, 1912 (Phila.); *idem* 2420, Buffalo, New York, August 25, 1912 (Phila.).

It is interesting to note that many years before Greene's study of this species it had been treated as distinct at the Botanical Garden of Pisa and had been named *Bidens lucida*. A search for this name proved fruitless, but I have seen at least four sheets of material (Berl., *C. Loeffler* legit, ex herb. A. Braun, etc.) so named.

Bidens vulgata var. β. **puberula** (Wieg.) Greene, Pittonia 4: 250. 1901.

Bidens frondosa var. *puberula* Wieg. Bull. Torr. Bot. Club 26: 408. 1899.

Bidens puberula (Wieg.) Rydb. Fl. Pr. Plains Cent. N. Amer. 849. 1932.

Plerumque valde et perspicue puberula.

Type specimen: Collected by *Joachim Heinrich Schuette*, Green Bay, Wisconsin (Gray).

Distribution: With the species proper.

Specimens examined: *E. B. Harger* 6181, meadow thickets, Rocky Hill, Connecticut, September 24, 1912 (Gray); *C. H. Knowlton*, Boston, Massachusetts, September 5, 1916 (Phila.); *Pammel & Ball* 64, Ames, Iowa, August 22, 1896 (Berl.; Field; Gray); *L. H. & Violet Pammel* 56, eodem loco, September, 1909 (Gray); *A. S. Pease*,

waste ground, Champaign, Illinois, September 25, 1919 (Gray); *J. H. Schuette*, Green Bay Marsh, Wisconsin, September 7, 1897 (Field, 2 sheets); *idem*, field, Ashwabenon, Wisconsin, August 26, 1878 (Field); *L. R. Waldron & T. F. Manns*, vicinity of Fargo, North Dakota, August 13, 1901 (Berl.; Gray).

A variety at times very striking because of its dense pubescence. At other times the pubescence is weak and distinction from the species proper is difficult. For this reason I have not in the past differentiated consistently between the two forms; thus the list of specimens cited for the species proper doubtless includes several which are referable to var. *puberula*.

Bidens vulgata var. γ. **schizantha** Lunell, Amer. Midl. Nat. 5: 65. 1917. Pl. LXIII, fig. *b*.

Bidens vulgata var. *dissectior* Sherff, Bot. Gaz. 80: 380. 1925.

A specie foliis principalibus bipinnatis vel tripinnatisectis differt.

Type specimen: Collected by *Joel Lunell*, No. 1161, in waste or cultivated places, western North Dakota, September, 1915 (Minn.).

Distribution: Saskatchewan to Lake Superior and western North Dakota.

Specimens examined: *E. Bourgeau* (*Palliser's Brit. N. Amer. Expl. Exped.*), rather rare, willow marsh at edge of Saskatchewan River, Saskatchewan, September 18, 1857 (Berl.; Gray; Kew; Par.; cotype and type specimens of var. *dissectior* Sherff); *O. E. & G. K. Jennings* 2178, fields, 4 miles southwest of Murillo, west of Fort William, Ontario, August 22, 1912 (Carn.); *Lunell* 1161 (type, Minn.).

EXPLANATION OF PLATE LXIII

Bidens vulgata, figs. *a*, *c–h*: *a*, flowering and fruiting specimen, ×0.6; *c*, exterior involucral bract, ×2.4; *d*, interior involucral bract, ×2.4; *e*, ray floret, ×3.6; *f*, palea, ×2.4; *g*, disc floret, ×3.6; *h*, achene, ×2.4; all from *Sherff* 1881, in Hb. Field.

Bidens vulgata var. *schizantha*, fig. *b*: cauline leaf, ×0.6; from *E. Bourgeau*, Saskatchewan, September 18, 1857 (type of *Bidens vulgata* var. *dissectior* Sherff), in Hb. Par.

86. **Bidens comosa** (Gray) Wieg. Bull. Torr. Bot. Club 24: 436. 1897; cf. Hook. ex Short & Peter, Suppl. Cat. Pl. Kentucky 598. 1833; cf. Hook. ex Short in Torr. & Gray, Fl. N. Amer. 2: 352. 1843. Pl. LXIV.

Bidens comata L. ex W. J. Hook. Comp. Bot. Mag. 1: 99. 1835 (nomen subnudum).

Bidens connata var. *comosa* A. Gray, Man. ed. 5. 261. 1867.

Bidens comosa var. *acuta* Wieg. op. cit. 26: 411. 1899.

Bidens acuta (Wieg.) Britt. Man. 1001. 1901.

Bidens riparia Greene, Pittonia 4: 261. 1901; non *B. riparia* H.B.K. Nov. Gen. et Sp. 4: 185 (236). 1820.

Herba annua, glabra, erecta, caule pallido saepe valida, 3–8 dm. alta, ramosa ramis brevibus et suberectis. Folia subsessilia vel petiolata petiolis marginatis, pallida, indivisa, elliptico-lanceolata, regulariter serrata vel interdum (in speciminibus depauperatis) integra, saepe obscure spinuloso-ciliata, 4–12 cm. longa. Capitula discoidea, ad anthesin parva, matura (bracteis exterioribus non inclusis) 1.5–2.2 cm. lata et 1.1–1.3 cm. alta. Involucrum basi fere glabrum; bracteis exterioribus 6–8, magnis, foliaceis, linearibus vel lanceolatis, suberectis vel parce patentibus, spinuloso-ciliatis, saepe serratis, basim versus angustatis, apice acutis, 2–5 cm. longis; interioribus valde membranaceis, lanceolatis, capitulo paulo brevioribus. Florum tubulosorum limbus saepe tantum 4-lobatus. Achaenia subplana, una facie ad lineam medianam costata, marginibus retrorsum hamosa et interdum tuberculata, aliter fere glabra, cuneata, olivaceo-brunnea vel interdum subpurpurascentia, corpore 5–10 mm. longa et 2.5–3 mm. lata, apice 3- (rarissime 2- vel 4-) aristata aristis retrorsum hamosis et plerumque 4–6 mm. longis.

Type specimen: No specimen was cited, but Illinois was the first mentioned, type locality.

Distribution: From Maine, Quebec, and North Dakota southward and southwestward to North Carolina, Tennessee, New Mexico, and Utah.

Specimens examined: *E. B. Bartram* 1372, Valley Forge, Pennsylvania, October 16, 1910 (Phila.); *J. M. Bates*, St. Paul, Nebraska, September 17 and 25, 1910 (Gray; N.Y.); *W. M. Benner*, Telford, Pennsylvania, September 14, 1913 (Phila.); *idem*, above Point Pleasant, Pennsylvania, September 16, 1923 (Phila.); *N. L. Britton*, Four Corners, Staten Isl., New York, September 23, 1894 (N.Y.); *B. F. Bush* 31, Courtney, Missouri, September 11, 1892 (Gray); *idem* 49, eodem loco, September 28, 1892 (Gray); *idem* 164, wet banks, Jackson Co., Missouri, September 30, 1893 (Field; Mo.; U.S.; type material of *Bidens riparia* Greene); *idem* 216, Courtney, Missouri, October 15, 1896 (U.V.); *idem* 802, common in low ground, eodem loco, September 11, 1899 (Gray); *idem* 804, eodem loco et tempore (Carn.; Gray); *idem* 1798, common in bottom, eodem loco, October 19, 1902 (Gray); *idem* 1816 and 1817, common in bottom,

eodem loco, October 21, 1902 (N.Y.); *idem* 1891, bottoms, eodem loco, September 22, 1903 (Gray; N.Y.); *idem* 6164 and 6165, bottoms, eodem loco, August 24, 1910 (Gray); *V. H. Chase* 123, west of Wady Petra, Illinois, September 15, 1897 (Field); *D. Clarke*, Flint, Michigan, 1866 (Phila.); *C. A. Davis*, low grounds, Alma, Michigan, September 29, 1893 (Phila.); *idem* 4872, Alma, Michigan, September 29, 1893 (Phila.); *idem* 6039, eodem loco et tempore (N.Y.); *C. C. Deam*, Wells County, Indiana, September 21, 1902 (Berl.); *R. R. Dreisbach* 167, Pickaway Co., Ohio, September 4, 1912 (Phila.); *Thomas Drummond*, St. Louis, Missouri, 1832 (Kew); *idem* 315, eodem loco (Kew); *E. H. Eames* 159, moist roadside, Stratford, Connecticut, September 24, 1902 (Gray); *H. Eggert*, Indian Lake, St. Clair Co., Illinois, October, 1876 (Carn.); *W. W. Eggleston* 5290, Kuttawa, Kentucky, September 27–October 9, 1909 (Mo.); *George Engelmann*, St. Louis, Missouri, September, 1866 (Gray); *idem* 566, eodem loco, September, 1834 (Berl.); *M. L. Fernald*, damp field, Orono, Maine, September 19, 1889 (N. Eng.); *idem*, ditch, Dexter lime quarries, Lincoln, Rhode Island, October 6, 1906 (Gray); *William Findley*, Collingdale, Pennsylvania, October 3, 1911 (Phila.); *W. H. Forwood* 224, near Fort Meade, Black Hills, South Dakota, September 8, 1887 (U.S.); *J. R. Gardner* 809, Fayette Co., Iowa, September 3, 1898 (N.Y.); *G. Guttenberg*, near Wheeling, West Virginia, October, 1878 (Carn.); *E. B. Harger*, Oxford, Connecticut, September 27, 1917 (Phila.); *A. A. Heller*, about the mouth of the Tucquan, Lancaster Co., Pennsylvania, September 20, 1901 (Berl.; Par.); *Katharina R. Holmes*, near Apollo, Westmoreland Co., Pennsylvania, September 3, 1902 (Carn.); *I. F. Holton*, Kanawha Salines, West Virginia, October 8, 1849 (Field); *L. S. Hopkins*, Kent, Ohio, September 20, 1913 (Carn.); *Janin* 28, Albany, New York, 1827 (Del.); *O. E. Jennings*, swampy spot with *Typha*, south of Logan's Ferry, Pennsylvania, September 23, 1916 (Carn.); *idem*, Conger, Pennsylvania, September 22, 1904 (Carn.); *M. E. Jones* 1063, alt. 1,290 meters, Salt Lake City, Utah, July 24, 1879 (Berl.; Brit.; Field; U.V.); *T. H. Kearney* 138, Plummer's Isl. in Potomac River, near Cabin John, Maryland, August 21–23, 1903 (N.Y.); *idem* 185, eodem loco, August 30, 1903 (N.Y.); *C. H. Knowlton*, Sturbridge, Massachusetts, September 27, 1917 (Phila.); *C. D. Lippencott*, Swedesboro, New Jersey, October 5, 1894 (Phila.); *C. G. Lloyd*, near Cincinnati, Ohio, September 18, 1882 (U.V.); *idem*, eodem loco, September 2, 1883 (Mus. V.); *Bayard Long* 6787, Edge Hill Station, Pennsylvania, September 24, 1911 (Phila.);

BIDENS VULGATA Greene (figs. *a*, *c–h*); var. SCHIZANTHA Lunell (fig. *b*)

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J. Lunell, alkaline soil, Leeds, North Dakota, September 10, 1901 (Deam); *idem*, Towner, North Dakota, September 10, 1908 (N.Y.); *idem*, Leeds, North Dakota, September 6, 1909 (Mun.); *idem*, dry bottoms, eodem loco, September 9, 1917 (Deam); *Alexander Mac Elwee*, Lyonville, Pennsylvania, October 4, 1908 (Phila.); *Alexander MacElwee, Jr.*, West Philadelphia, Pennsylvania, August, 1874 (Phila.); *Marie-Victorin* 9737, moist places, vicinity of Longueuil, Quebec, September 10–October 9, 1919 (Gray; Par., 2 sheets); *idem* 15466, Longueuil, September, 1922 (Gray); *C. J. Moser*, Bethlehem, Pennsylvania, August, 1832 (Kew); *G. S. Miller, Jr.*, Passage Creek, Virginia, September 5, 1897 (U.S.); *G. V. Nash*, along a pond, vicinity of Clifton, New Jersey, September 24, 1892 (N.Y.); *H. W. Norris*, near Ithaca, New York, 1889 (Mo.); *J. B. S. Norton*, Manhattan, Kansas, September 1, 1892 (type material of *Bidens acuta* [Wieg.] Britt.; N.Y.); *idem* 281 p.p., wet places, Riley Co., Kansas, September 21, 1895 (N.Y.); *B. H. Patterson*, west of Ligonier, Pennsylvania, September 18, 1917 (Can.); *A. S. Pease*, edge of pond, East Watertown, Massachusetts, October 8, 1908 (N. Eng.); *Robert Peter*, damp soil, Lexington, Kentucky, September, 1833 (Kew); *P. E. Pierron*, Westmoreland Co., Pennsylvania, September 3, 1877 (Cop.); *W. M. Pollock*, Upshur County, West Virginia, August 28, 1895 (U.S.); *T. C. Porter*, Chestnut Hill, Easton, Pennsylvania, September 22 (Carn.); *H. W. Pretz* 11220, vicinity of Centre Valley, Pennsylvania, October 2, 1921 (Phila.); *Rugel* 448, in swampy places near Rutherfordton, North Carolina, September, 1841 (Brit.; Del.; Kiel; Mus. V.); *A. Ruth* 32, near Tennessee River, Knoxville, Tennessee, September, 1896 (N.Y.; forma involucri bracteis exterioribus giganteis); *A. Schrader* 129, Ohio, 1864 (Berl., 2 sheets); *Schweinitz*, Salem, North Carolina (Phila.); *E. E. Sherff* 2046, in pasture, near Glenwood, Illinois, October 7, 1915 (Field); *C. W. Short*, bottom of dried mill pond, etc., Lexington, Kentucky (Kew; Phila., 2 sheets); *idem*, Rock Isl., Ohio River, 1840 (Phila.); *A. H. Smith*, Gray's Ferry, Philadelphia, Pennsylvania, September 23, 1866 (Penn.); *B. H. Smith*, alt. 1,800 meters, Ojo Caliente, New Mexico, August 26, 1893 (Phila.; plantis parvis sed certe hac specie); *idem*, eodem loco, August 25, 1894 (Phila.); *P. C. Standley* 9853, low ground, vicinity of Turner, Missouri, September 5, 1912 (U.S.); *idem* 9869, along stream, vicinity of Graydon Springs, Missouri, September 7, 1912 (U.S.); *E. S. Steele*, vicinity of Washington, District of Columbia, August 24–September 4, 1896 (U.V.); *idem*, eodem loco, September 16, 1899 (Del.); *idem & uxor* 226, alt.

600 meters, Sweet Springs, West Virginia, September 6, 1903 (Gray); *Witmer Stone* 10818, 10820, and 10824, Delaware River meadows, Tinicum Township, Pennsylvania, September 13, 1908 (Phila.); *W. C. Werner* 409, Columbus, Ohio, September 27, 1892 (Gray); *C. F. Wheeler & E. S. Steele*, alt. 490 meters, vicinity of Millboro, Virginia, August 30, 1907 (U.S.); *Charles Williamson*, Council Bluffs, Iowa, August, 1898 (Phila.); *H. A. Young*, Revere, Massachusetts, September 27, 1879 (N. Eng.).

Hooker (loc. cit.) listed a *Bidens comata* L. as a determination for *Thomas Drummond* 540, from St. Louis, Missouri. Later, Short and Peter (loc. cit.) listed the name *Bidens comosa* Hooker. Still later, Torrey and Gray (loc. cit.) stated: "This species [*B. connata* Muhl.] is introduced into Dr. Short's Catalogue of Kentucky plants under the name of *Bidens comosa*, Hooker, but we are not aware that Sir Wm. Hooker, or any other author, has published a species with this name. In the account of *Drummond's* collections in the United States, however, a '*Bidens comata* Linn.' is enumerated; but as Linnaeus has no such species, we suppose *B. connata*, Muhl. to be intended." We may add to Torrey and Gray's observations by noting that the words *comata* and *comosa*, while very distinct in pronunciation and in print, are apt to be similar in script. Thus, despite the fact that the name *comosa* (in the sense of leafy) is indeed appropriate for the plants so designated, it might be that the name originated not through an intentional changing of words, but rather from a misreading of the really equivalent word *comata* as it appeared in script. Short's plants in herbaria are variously labeled.[1] The name *comosa* Hook. ex Short & Peter therefore not only is a nomen nudum but fails to admit of definite interpretation. Fortunately, Gray (loc. cit.) did not cite Short's name when establishing the var. *comosa* nor did Wiegand (loc. cit.) go back to Short when elevating the name to specific rank.

Daniels (Univ. Missouri Studies, Sci. Ser. 1: 378 [reprint 236]. 1907) lists a supposed hybrid between *B. comosa* and *B. polylepis* (*Coreopsis involucrata* Nutt.). Such a hybrid is unknown to me.

EXPLANATION OF PLATE LXIV

Bidens comosa: a, flowering and fruiting specimen, ×0.56; *b*, exterior involucral bract, ×2.22; *c*, interior involucral bract, ×2.22; *d*, palea, ×2.22; *e*, disc floret, ×4.45; *f* (outer), *g* (inner), achenes,

[1] Three random specimens of this species collected by Short (Phila.), for example, have severally the determinations: "*B. connata β. petiolata*"; . . . "*B. cernua* var. *minima?*"; . . . "*B. cernua?*"

BIDENS COMOSA (Gray) Wieg.

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×4.45; all from *E. E. Sherff*, Elgin, Illinois, October 5, 1913, in Hb. Field.

87. **Bidens connata** Muhl. in Willd. Sp. Pl. 3: 1718. 1804. Pl. LXV, fig. *d*.

Bidens connata var. *typica* Fass. Rhodora 30: 31. 1928.

a. Folia principalia indivisa vel fere tripartita, nunc solum grosse dentata nunc etiam in segmenta 3 lato-lanceolata secta.

b. Achaeniorum margines non antrorsum hamosae nisi interdum ad basim.

c. Petioli alati; foliis principalibus saepe trisectis.

d. Involucri bracteae exteriores longitudine raro 1.5 cm. superantes.....*B. connata* sensu stricto.

d. Involucri bracteae exteriores 3–6 cm. longae . . var. *η. fallax*.

c. Petioli anguste marginati.

d. Folia plerumque indivisa, rarius 2–3-secta . . var. *γ. petiolata*.

d. Folia principalia saepius 3- (vel etiam 5-) lobata. var. *ε. gracilipes*.

b. Achaeniorum margines summam versus plus minusve antrorsum hamosae.

c. Aristae antrorsum ac retrorsum hamosae. . . var. *δ. ambiversa*.

c. Aristae solum antrorsum hamosae.....var. *β. anomala*.

a. Folia principalia pinnatim 3–7-partita, foliolis anguste lanceolatis. var. *ζ. pinnata*.

Herba annua, glabra, saepe ramosa, 0.4–1.5 m. alta, caule plerumque purpurascenti. Folia petiolata petiolis alatis et 0.5–3 cm. longis, petiolo adjecto 0.5–1.6 dm. longa, dentibus acutis extensisque valde serrata, margine spinulis inconspicuis vestita, principalia plerumque tripartita (rarissime omnia indivisa, acuminata, elliptica vel lanceolata, basi angusta sed non in petiolum evidenter angustata); foliolo terminali lanceolato, saepe in basim petiolulatam angustato, lateralibus lanceolatis vel triangulato-ovatis, saepe oppositis connatisque. Capitula (bracteis exterioribus non inclusis) demum 1.2–1.4 cm. lata et circ. 1 cm. alta, discoidea vel rariter inconspicue radiata, pedunculata pedunculis tenuibus 1–6 cm. longis. Involucrum superne plerumque glabratum; bracteis exterioribus 4–5 (–7), rariter valde foliaceis, linearibus, integris, sparsim setosociliatis, plerumque 1–2 (rarius –4) cm. longis; interioribus ovato-lanceolatis quam capitulo paulo brevioribus. Flores ligulati (nisi deficientes) minimi, aurei; flores tubulosi 4–5-lobati. Achaenia

cuneata, subnigra vel debiliter purpurascentia, pauca marginalia plana vel trigona et saepe 2–3-aristata, omnia reliqua plerumque tetragona quadriaristataque, margine basaliter 1-paucis erectis hamis aliter hamis semper vel fere semper retrorsis munita, faciebus tuberculato-setosa, corpore 3.5 (exteriora) –6.5 (interiora) mm. longa; aristis retrorsum hamosis, 1–3.6 mm. longis.

Type specimen: Collected by *Gotthilf Henry Ernst Muhlenberg* in North America (Willd., Herb. No. 15021–1).

Distribution: Nova Scotia and Quebec southward to New Jersey and westward. A single specimen observed from Alabama (collected by Rafinesque).

Specimens examined: *C. F. Batchelder*, Winchester, Massachusetts, October 7, 1917 (Phila.); *idem* 2071, along brookside by Lake Saltonstall, Branford, Connecticut, September 12, 1914 (N. Eng.; capitulis radiatis); *Boott*, Boston, Massachusetts, 1829 (Kew); *Brinton & Keller*, Egg Harbor, New Jersey, September 22, 1894 (Phila.); *F. S. Collins* 956, Cranberry Bog, Eastham, Massachusetts, September 6, 1910 (N. Eng.); *J. F. Collins, M. L. Fernald, & H. H. York* 11462, Warwick, Rhode Island, September 8, 1914 (N. Eng.); *Eames, Randolph, & Wiegand* 13200, Montezuma, New York, September 9, 1919 (Gray); *iidem* 13201, Aurelius, New York, September 9, 1919 (Gray); *A. A. Eaton & M. L. Fernald*, brackish margin of pool, Salisbury, Massachusetts, October 2, 1902 (Gray); *C. E. Faxon*, Jamaica Plain, Massachusetts (Gray); *M. L. Fernald & Bayard Long* 10681, Greenough Pond, Yarmouth, Massachusetts, September 19, 1913 (N. Eng.; Phila.); *iidem* 10687, Winter Pond, Winchester, Massachusetts, October 5, 1913 (N. Eng.; Phila.); *iidem* 14844, Bowdoinham, Maine, September 14–19, 1916 (Phila.); *iidem* 17604, north of No Bottom Pond, Brewster, Massachusetts, September 7, 1918 (Phila.); *iidem* 24695, Lahave River, Bridgewater, Nova Scotia, August 16, 1921 (Gray; Phila.); *iidem & G. S. Torrey* 10679, Block Isl., Rhode Island, September 13, 1913 (Phila.); *iidem* 10680, near Grace Point, Block Isl., September 14, 1913 (Gray; Phila.; nonnullis foliis 5-partitis); *M. L. Fernald & E. E. Sherff*, near Winter Pond, Winchester, Massachusetts, July 27, 1913 (Field); *M. L. Fernald & C. A. Weatherby*, shore of Winter Pond, Winchester, September 22, 1908 (Gray); *iidem* (*Pl. Grayanae Exsicc.*) 298, eodem loco (Berl.; Can.; Carn.; Cop.; Del., 2 sheets); *Grace Gilbert*, Pine Grove, Newton, Massachusetts, Sept., 1893 (Gray); *A. Gershoy* 737, Como Lake, Belmar, New Jersey, Sept. 7, 1917 (Gray); *P. Heuser*, Lutheran Hill, Long Isl., New York, September 10, 1894 (Berl.);

idem, Cypress Hill near Brooklyn, New York, September 29, 1894 (Berl.); *G. G. Kennedy*, Portsmouth, Rhode Island, September 19, 1907 (Gray); *idem*, Bailey's Beach, Newport, Rhode Island, September 19, 1907 (Gray); *idem* 8, meadow ditch, Danvers, Massachusetts, September 7, 1907 (Gray); *John Macoun*, St. Anne de Beaupré, Quebec, August 30, 1905 (Gray); *Marie-Victorin* 16247, River Jésus, Rosemère, Quebec, September 22, 1922 (Gray); *H. B. Meredith*, Cape May, New Jersey, October 10, 1920 (Phila.); *Muhlenberg*, North America (type in Willd., Herb. No. 15021–1); *S. T. Olney*, Block Isl., Rhode Island (Mun.); *T. C. Porter*, Delaware River above Easton, Pennsylvania, September 5, 1899 (Carn.); *idem*, Pot Rock on Delaware River above Easton, September 7, 1899 (Carn.); *H. W. Pretz* 10288, vicinity of Slatedale, Pennsylvania, August 1, 1920 (Phila.); *Rafinesque*, Appalachian Mts., Alabama (Petrop.); *F. C. Seymour* 1550, Tea Lane, Chilmark, Martha's Vineyard, Massachusetts, September 21, 1916 (Gray); *Witmer Stone* 10823, meadows of Delaware River, Tinicum Township, Delaware Co., Pennsylvania, September 13, 1908 (Phila.); *E. F. Williams*, Weston, Massachusetts, September 29, 1895 (Gray); *idem*, Concord, Massachusetts, September 17, 1899 (Gray); *R. W. Woodward*, Old Saybrook, Connecticut, September 29, 1915 (Gray).

Bidens connata var. *β*. **anomala** Farwell, Ann. Rept. Comm. Parks and Blvds. Detroit 11: 91. 1900. Pl. LXV, fig. *k*.

A specie achaeniorum aristis erecte barbatis differt.

Type specimen: None cited. Presumably a specimen had been found growing at Detroit, Michigan.

Distribution: Maryland, Ohio, Michigan, and Wisconsin.

Specimens examined: *S. F. Blake* 8680, edge of Chesapeake and Ohio Canal, vicinity of Cabin John, Maryland, October 21, 1923 (Field); *idem* 8901, eodem loco, October 5, 1924 (Gray); *R. W. Chaney* 184, edge of Hamlin Lake, Ludington, Michigan, August 20, 1910 (Gray; N.Y.); *N. C. Fassett* 4259, muddy edge of a ditch, "The Narrows," Minocqua, Wisconsin, September 14, 1927 (Wis., 2 sheets); *A. D. Selby* 6, Ohio, September 6, 1890 (Gray).

Bidens connata var. *γ*. **petiolata** (Nutt.) Farwell, Ann. Rept. Comm. Parks and Blvds. Detroit 11: 91. 1900. Pl. LXV, figs. *a*, *f–j*.

Bidens petiolata Nutt. Journ. Acad. Phila. 7: 99. 1834.

Bidens connata var. *inundata* Fern. Rhodora 23: 298. 1921.

Folia plerumque indivisa, lanceolata, usque ad 1 (rarius 2) dm. longa et usque ad 3 (rarius etiam 7) cm. lata, moderate acriterque dentata dentibus unico latere saepius 6–12; petiolis tenuibus, usque ad 5 cm. longis, marginatis. Involucri bracteae exteriores circ. 5, plerumque 1–2 cm. longae. Achaenia exteriora corpore plerumque 4.2–4.6 (interdum usque ad 6.5) mm. longa, interiora saepius circ. 6.2–6.5 (rarius usque ad 8) mm. longa.

Type specimen: No type was cited by Nuttall. The nativity was given by him as "on the margins of ponds in various parts of New England." The Nuttall Herbarium has two authentic sheets starred with Nuttall's customary asterisk as being of new material (although on the labels he had used a trivial name referring to the lanceolate rather than petiolate nature of the leaves). One (Phila.) says "Massachusetts" and the other (Brit.) gives "Northampton" (Massachusetts).

Distribution: Nova Scotia, Quebec, Ontario, and Minnesota, southward to Virginia, Tennessee, Missouri, and Kansas. Also rarely adventive in France and Germany.

Specimens examined: *E. B. Bartram* 1280, creek margin, Bradford Hills, Pennsylvania, October 2, 1910 (Gray); *idem* 1339, Paoli, Pennsylvania, October 16, 1910 (Gray); *J. M. Bates* 5424, Red Cloud, Nebraska, October 3, 1910 (N.Y.); *C. H. Bissell* 295, Southington, Connecticut, August 31, 1891 (N. Eng.); *Ezra Brainerd*, along creek, Middlebury, Vermont, September 23, 1904 (Gray); *O. H. Brown* 113, New England Marshes, Cold Spring, New Jersey, September 18, 1913 (Phila.); *B. F. Bush* 36, Courtney, Missouri, September 11, 1892 (Gray); *idem* 806, eodem loco, September 11, 1899 (Gray); *E. B. Chamberlain* 443, swamp, Bristol, Maine, August 28, 1897 (N. Eng.); *F. S. Collins* 511 and 540, Eastham, Massachusetts, September 1, 1907 (N. Eng.); *William Darlington*, West Chester, Pennsylvania (Phila.); *John Davis* 5203, Riverview Park, Hannibal, Missouri, September 8, 1916 (Mo.); *idem* 9058, pastures, near Mt. Olivet Cemetery, Hannibal, September 14, 1918 (Mo.); *C. C. Deam* 5369, northwest of Decatur, Indiana, September 8, 1908 (Deam; forma capitulis perspicue radiatis); *Donnot* (*Soc. Cénomane d'Exsicc.* No. 1650), Percey-le-Petit, canal de la Marne à la Saône, Department of Haute-Marne, France, September, 1923 (Gray); *R. R. Dreisbach* 2–217, Vereeville, Pennsylvania, September 25, 1922 (Phila.); *T. W. Edmonson*, Haley's Station, Renfrew Co., Ontario, August 25, 1902 (Phila.); *M. L. Fernald*, Vanceboro, Maine, September 1, 1908 (Gray); *idem* 2895, low woods, Glenburn, Maine,

BIDENS CONNATA Muhl. *ex* Willd. (fig. *d*); var. ANOMALA Farwell (fig. *k*); var. PETIOLATA (Nutt.) Farw. (figs. *a*, *f–j*); var. PINNATA Wats. (fig. *e*); var. FALLAX (Warnst.) Sherff (figs. *b*, *c*)

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September 6, 1898 (N. Eng.); *idem & D. H. Linder* 22868, Quinan, Nova Scotia, October 8, 1920 (Phila.); *iidem* 22871, springy sphagnous bog, Sand Beach, Yarmouth Co., Nova Scotia, October 6, 1920 (Field; Gray, 3 sheets; Phila.); *M. L. Fernald & B. Long* 10682, White Pond, Chatham, Massachusetts, September 9, 1913 (N. Eng.; Phila.); *iidem* 10686, Dennis Pond, Yarmouth, Massachusetts, September 19, 1913 (Phila.); *iidem* 14845, Back River Creek, Woolwich, Maine, September 15, 1916 (Phila.); *iidem* 22866, sandy brooksides and springy ditches, Baddeck, Nova Scotia, August 27, 1920 (Gray, 2 sheets; Phila.); *iidem* 22867, pools at base of gypsum cliffs, Port Bevis, Nova Scotia, August 29, 1920 (Gray; Phila.); *iidem & D. H. Linder* 22869, springy sphagnous bog, Sand Beach, Yarmouth Co., Nova Scotia, September 7, 1920 (Field; Gray); *iidem* 22870, eodem loco et tempore (Gray); *Fernald, Long, & Torrey* 10684, Block Isl., Rhode Island, September 13, 1913 (New Eng.); *iidem* 10685, Harbor Pond, Block Isl., September 13, 1913 (Phila.); (*M. L. Fernald & C. A. Weatherby* 17609, once referred to var. *petiolata*, is apparently better construed as var. *gracilipes;*) *J. M. Greenman* 501, Concord, Massachusetts, Oct. 9, 1898 (Mo.); *Gustave Guttenberg*, Erie, Pennsylvania, September 9, 1879 (Carn.); *E. B. Harger* 4833 p.p., Huntington, Connecticut, August 25, 1905 (Phila.); *J. W. Harshberger*, Ocean City, New Jersey, August 23, 1900 (Penn.); *A. A. Heller*, in limestone, Dillerville Swamp, Lancaster Co., Pennsylvania, September 13, 1901 (Berl.); *A. S. Hitchcock* 735 pro parte, wet soil, Atchison Co., Kansas, 1896 (Mo.); *R. Hoffman*, muddy bank in shade, Indian Creek, Dodson (vicinity of Kansas City), Missouri, September 30, 1916 (Mo.); *J. M. Macfarlane*, Holly Beach, New Jersey, September 12, 1907 (Penn.); *idem*, Peak's Isl., Casco Bay, Maine, September, 1913 (Penn., 2 sheets); *John Macoun*, wet places, Hull, Quebec, August 23, 1884 (Can.); *idem*, Ottawa, Ontario, August 28, 1894 (U.S.); *idem*, Brown's Lake, Wakefield, Quebec, August 29, 1903 (Can.); *idem*, Italy Cross, Nova Scotia, August 22, 1910 (Can.); *idem*, Casselman, Ontario, September 13, 1911 (Can.); *P. Magnus*, Prov. Brandenburg, Germany, November 3, 1895 (Berl.); *Marie-Victorin* 28084, edge of stream, Les Grèves, Quebec, September 23, 1928 (Gray); *W. R. Maxon* 5962, near Cabin John, Maryland, October 10, 1912 (U.S.); *A. H. McKay*, on beaches, Pictou, Nova Scotia, September, 1875 (N.Y.); *E. A. Mearns* 159, Camp Douglas, Wisconsin, September 11, 1890 (U.S.); *C. J. Moser*, Pennsylvania, August, 1832 (Mus. V.); *G. V. Nash*, stony shore, in water, vicinity

of Clifton, New Jersey, September 25, 1892 (N.Y.); *J. B. Norton* 281 p.p., Riley Co., Kansas, September 21, 1895 (Gray; U.V.); *B. H. Patterson*, Chautauqua, New York, September 3, 1910 (Carn.); *F. W. Pennell* 6625, Point Pleasant, New Jersey, September 22, 1915 (Phila.); *Albert Ruth* 63, open places, Knoxville, Tennessee, September 10, 1905 (Gray); *J. H. Sandberg* 919, Silver Creek, Minnesota, August 29, 1891 (U.S.); *H. E. Sargent* 73, shore of Lake Wentworth, Wolfboro, New Hampshire, September 2, 1909 (Gray); *idem* 77, Wolfboro, September 18, 1909 (Gray); *J. H. Schuette*, in cedar swamps, Wisconsin, September 7, 1878 (Field); *F. C. Seymour* 9, Granville, Massachusetts, September 15, 1913 (Gray); *J. A. Shafer*, Presque Isle, Pennsylvania, September 9–12, 1900 (Carn.); *E. E. Sherff* 1803, Elgin, Illinois, August 27, 1912 (Field); *G. H. Shull* 399½, vicinity of Havre de Grace, Maryland, September 20, 1902 (U.S.); *E. S. Steele*, vicinity of Washington, District of Columbia, August 24, 1896 and September 7, 1899 (Del.; forma nonnullis capitulis radiatis, ligulis circ. 3 vel 4 flavis ± 5 mm. longis); *idem & uxor*, alt. about 900 meters, vicinity of Aurora, West Virginia, September 11, 1898 (Del.); *Harold St. John* 1345, Sable Isl., Nova Scotia, September 12, 1913 (Gray); *idem & G. S. Torrey* 891, Lincoln, Rhode Island, October 19, 1913 (N. Eng.); *Witmer Stone* 6236, meadows along Delaware River, Tinicum Township, Delaware Co., Pennsylvania, September 20, 1903 (Phila.); *idem* 10725, Atlantic City, New Jersey, September 4, 1908 (Phila.); *idem* 10860, Pennsylvania, September 9, 1908 (Phila.); *idem* 10908, Delanco, New Jersey, September 11, 1908 (Phila.); *idem* 11052, Seaside Park, Ocean Co., New Jersey, September 27, 1908 (Phila.); *I. Tidestrom* 6890, wet places, Emporia, Virginia, September 22, 1913 (U.S.); *S. S. VanPelt*, Palermo, New Jersey, September 20, 1908 (Phila.); *Herman von Schrenk*, Ithaca, New York, October 1, 1892 (Mo.); *C. S. Williamson*, Williamson School, Delaware Co., Pennsylvania, September 23, 1906 (Phila.).

Bidens connata var. *inundata* Fern. was based upon *Fernald & Linder* 22871 (type), *Fernald, Long, & Linder* 22869 and 22870, and *Fernald & Long* 22866 and 22867, all from Nova Scotia. It was described as "closely simulating var. *gracilipes* Fernald . . . of the Cape Cod quagmires but with much larger achenes." The leaf margins do at times suggest those in var. *gracilipes*, but are matched quite closely by those in several specimens of var. *petiolata* from various widely separated localities. The achenes likewise match those of var. *petiolata*, leaving me entirely unable to distinguish *inundata* separately.

BIDENS HETERODOXA Fern. & St. J. (figs. *a*, *c–g*); var. ORTHODOXA Fern. (figs. *b*, *h*)

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Through the var. *petiolata*, *B. connata* approaches *B. Eatonii* Fern., the var. *interstes* of which frequently can not be distinguished (from *B. connata* var. *petiolata*) except by its achenes.

Bidens connata var. δ. **ambiversa** Fassett, Rhodora 30: 33. 1928.

Herba subsimplex vel ramis tenuibus ramosa, 3–7 dm. alta. Folia mediana dentata dentibus utrinque 1–4 plerumque 3 (quorum inferiores saepe 1.5 cm. longi sinibus paene ad rhachidem extendentibus sunt), 4–7 cm. longa; superiora saepe simplicia cum dentibus grossis utrinque 1–4. Involucri bracteae exteriores lineares vel lanceolatae, 1–3.5 cm. longae. Achaeniorum margines sparsim vel dense setis plerumque antrorsis setosi; aristis hamis (nunc sursum nunc retrorsum vel saepius utroque versis) munitis; achaeniis exterioribus planis, biaristatis, corpore circ. 5 mm. longis et 2–2.5 mm. latis; interioribus superne obcompresso-tetragonis, quadriaristatis, corpore 6–8 mm. longis.

Type specimen: Collected by *Norman Carter Fassett*, No. 4257, in moist kettle hole, with copious growth of *Dulichium*, Minocqua, Oneida County, Wisconsin, September 14, 1927 (Wis., 2 sheets).

Distribution: Known only from northern Wisconsin, where it has been collected chiefly in sphagnum bogs.

Specimens examined: *Fassett* 4257 (Wis., 2 type sheets); *idem* 4258, sphagnum bog, margin of Hill Lake, Minocqua, September 13, 1927 (Wis.); *idem* 9016, quaking bog, Big Wildcat Lake, Boulder Junction, Vilas Co., September 2, 1929 (Wis.); *idem* 9021, eodem loco et tempore (Wis.).

Bidens connata var. ε. **gracilipes** Fern. Rhodora 21: 103. 1919.

Folia primaria lobata, lobis 2–4 basalibus divergentibus decurrentibus, lobo terminali foliisque superioribus lanceolato-attenuatis anguste serratis dentibus subfalcatis, petiolis gracilibus vix marginatis. Achaenia exteriora corpore 3–4 mm. interiora 4.5–5 mm. longa, omnia plerumque quadriaristata aristis marginalibus 2–2.5 mm. longis, aristis intermediis brevioribus.

Type specimen: Collected by *Merritt Lyndon Fernald* and *Charles Alfred Weatherby*, No. 17608, sandy beach of Seymour Pond, Harwich, Massachusetts, September 19, 1918 (Gray).

Distribution: Maine and southward to Connecticut.

Specimens examined: *R. C. Bean, F. W. Bird, & C. H. Knowlton*, wet shore of Mashpee Pond, Mashpee, Massachusetts, September 16, 1916 (N. Eng.); *A. E. Blewitt* 1123, Hall and Upson Pond, Waterbury, Connecticut, September 15, 1911 (N. Eng.); *M. L. Fernald*

& B. Long 10683, peaty margins of small ponds west of White Pond, Chatham, Massachusetts, September 9, 1913 (Gray; N. Eng.); *iidem* 17602, between Grassy and Lower Simmons ponds, Dennis, Massachusetts, August 22, 1918 (Field; Gray; N. Eng.; Phila.; forma var. *petiolatae* adpropinquans); *iidem* 17606, quagmire in woods south of Sparrow Young's Pond, Chatham, Massachusetts, August 20, 1918 (N. Eng.); *iidem* 17607, borders of peaty quagmires east of Buck Pond, Harwich, Massachusetts, August 30, 1918 (Field; Gray, 2 sheets; N. Eng., 2 sheets; Phila.); *iidem & A. H. Norton* 14843, swales and peaty shores of Little Ossipee River, Limington, Maine, August 29, 1916 (N. Eng., 2 sheets; Phila.); *M. L. Fernald & C. A. Weatherby* 17608, sandy beach, Seymour Pond, Harwich, September 19, 1918 (type, Gray, 2 sheets: cotypes, Cop.; Field; Kew; N. Eng., 2 sheets); *iidem* 17609, sandy beach, Gull Pond, Wellfleet, Massachusetts, September 19, 1918 (Gray; N. Eng.; forma var. *petiolatae* adpropinquans).

Bidens connata var. ζ. **pinnata** Wats. in Gray, Man. ed. 6: 284. 1890. Pl. LXV, fig. *e*.

Bidens Sandbergii Rydb. Fl. Pr. Plains Centr. N. Amer. 849. 1932.

A specie differt foliis pinnatis, 5–7 foliolis angustis et plus minusve inciso-dentatis.

Type specimen: Collected by *F. L. Conillard*, Richfield, Hennepin County, Minnesota, June, 1889 (Gray).

Distribution: Wisconsin (ex Aldrich & Fassett, Science 70: 45. 1929) and Minnesota.

Specimens examined: *Z. L. Chandonnet*, wet sandy shores of lakes, Luce, Minnesota, August 25, 1911 (U.S.); *idem*, eodem loco, August 23, 1912 (Penn.; U.S.); *F. L. Conillard* (type, Gray); *O. Lakela* 1858 and 1860, Duluth, Minnesota (Field); *P. A. Rydberg* 9649, White Bear Lake, Minnesota, September 15, 1926 (N.Y., 2 sheets, pro specie nova, *Bidente Sandbergii*, a Rydbergio); *J. H. Sandberg*, wet sandy shores, Ramsey Co., Minnesota, August, 1890 (Penn.); *idem* 929, Ramsey Co., September 2, 1891 (U.S.); *idem* 6009, wet places, Ramsey Co., August, 1891 (N.Y.; Phila.).

The specimens examined clearly represent *B. connata* as apart from any other species and show no evidence of hybridity.[1] (But

[1] *Bidens connata* appears to hybridize very rarely in nature. I have seen two sheets of material (Hb. W. C. Ferguson) collected by W. C. Ferguson, Plattsdale, Long Island, New York, Sept. 20, 1919, which appeared clearly to be of hybrid origin—*B. connata* × *B. cernua*. The leaves were tripartite as in typical *B. connata;* the heads were radiate and much like those of *B. cernua*. A further specimen

BIDENS TRIPARTITA L. (figs. *a*, *b*, *d*–*i*); var. CERNUAEFOLIA Sherff (fig. *c*)

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cf. Britton & Brown, Ill. Fl. ed. 2. 3: 495. 1913; these authors have considered that the var. *pinnata* is possibly a hybrid between *B. cernua* and *B. aristosa*.)

Fassett (Rhodora 30: 34. 1928) gives an amplified description, based, however, upon fewer collections than those studied by me. More recently, he has reported (Science 70: 45. 1929; cf. McLaughlin, Ecological Monographs 2: 376, *fig. 31*. 1932) finding this variety upon certain relic lakes in northwestern Wisconsin, a few miles northeast of the type vicinity. As touching upon the constancy of this interesting foliage form, we may note that Sandberg collected it in 1890 in the same locality where Rydberg collected it thirty-six years later.

Bidens connata var. *η*. **fallax** (Warnst.) Sherff, Bot. Gaz. 76: 154. 1923. Pl. LXV, figs. *b* and *c*.

Bidens tripartita L. var.? *fallax* Warnst. Verh. Bot. Ver. Brandenb. 31: 157. 1880.

Bidens decipiens Warnst. Oesterr. Bot. Zeitschr. 45: 392 and 475. 1895.

Bidens connata Warnst., op. cit. 475, non exacte Muhl.

Bidens tripartita var. *fallax* Warnst. in Wieg. Bull. Torr. Bot. Club 26: 413. 1899.

Bidens connata var. *fultior* Fern. & St. John, Rhodora 17: 24. 1915.

Folia primaria laminis vel lobis terminalibus saepius grosse inaequaliterque dentatis, dentibus utrinque plerumque 5–10; involucri bracteis exterioribus foliaceis, oblanceolatis, majoribus 3–6 cm. longis et 0.5–1.5 cm. latis; achaeniis 4–6-aristatis.

Type specimen: Collected by *C. Warnstorf*, shore of Lake Neuruppin (where undoubtedly adventive from North America), Province of Brandenburg, Prussia, September 10, 1895 (herbarium not cited; various sheets in Del., Field, Kew, etc.).

Distribution: Quebec southward to Rhode Island and westward to Indiana, Wisconsin, and Minnesota; also at several places in northern Germany,[1] where doubtless introduced from North America.

by Emile F. Williams (Neponset Marshes, Readville, Massachusetts, Sept. 23, 1900; Gray), "with remarkably short rays—awns barbed downwards," has been collected as a supposed hybrid between *B. connata* and *B. coronata* (*B. trichosperma* Michx.).

[1] Specimens by Abbón (Del.) and Arsène (Field) purporting to come from Mexico, are unquestionably mislabeled (cf. Standley, Science n. ser. 65: 130. 1927).

Specimens examined: *E. B. Bartram* 1339, roadside ditch, Paoli, Pennsylvania, October 16, 1900 (Gray); *F. Erichsen*, Hamburg, Germany, September 18, 1902 (Mus. V.); *N. C. Fassett* 2883, floating dock, Minneiska, Minnesota, September 8, 1926 (N.Y.); *idem* 2884, damp ground, Rohrer's Slough, Cochrane, Wisconsin, September 7, 1926 (N.Y.; Wis.); *idem* 2888, rocky shore of Mississippi River, Alma, Wisconsin, August 23, 1926 (Wis.); *idem* 2976, wet shore, Fountain City Slough, Fountain City, Wisconsin, September 9, 1926 (Wis.); *idem* 12820, Potosi, Wisconsin, September 8, 1930 (Wis.); *Fernald, Long, & Torrey* 10688, Dickens Point, Block Isl., Rhode Island, September 15, 1913 (Gray, 2 sheets; N. Eng.; Phila.; type and cotype sheets of var. *fultior* Fern. & St. John); *Grantzow*, Prenzlau, Germany, August, 1877 (Del., 2 sheets); *R. Gross*, Köpenick on the Spree River, Prov. Brandenburg, Prussia, September 22, 1908 (Berl.); *Heiland*, Schluesoh, Prov. Brandenburg, August, 1876 (U.V.) and September, 1876 (Berl.); *R. Hülsch*, on driftwood, Rathenow, Prov. Brandenburg, Germany, September, 1896 (Berl., 2 sheets); *O. E. Lansing, Jr.*, 2641, Indiana (Berl.; Field; Mus. V.); *Olga Lakela* 1719, Duluth, Minnesota (Field); *A. Ludwig*, driftwood, Potsdam, Prussia, September 28, 1906 (Berl.); *A. R. Paul*, on driftwood upon the Parmitze, Stettin, Prov. Pomerania, Germany, Sept. 7, 1898 (Berl., 2 sheets); *Rottenbach*, along canal, Berlin, Prussia, September 26, 1896 (Berl.); *idem*, on the lime lake at Rüdersdorf, Prov. Brandenburg, Prussia, September 19, 1898 (Del., 2 sheets); *Justus Schmidt* 4107, on floated timber, Hamburg, Germany, September, 1896 (Berl.; Boiss.; Cop.; Del.; Mun.; Mus. V.; U.V.); *H. K. Svenson & N. C. Fassett* 918, tidal flats of St. Lawrence River, Levis, Quebec, August 9, 1923 (Gray); *C. Warnstorf*, shore of Lake Neuruppin, Prov. Brandenburg, Germany, October, 1877 (Berl.; Mus. V.); *idem*, especially common on floated timber, eodem loco, September, 1895 (Del.; Field; Kew; Mus. V.; U.S.; U.V.; type collection of *Bidens decipiens* Warnst.); *C. A. Weatherby*, clearing in cedar swamp, Dennis, Massachusetts, September 28, 1915 (N. Eng.); *E. F. Williams*, Lake Massapoag, Sharon, Massachusetts, September 10, 1899 (Gray); *E. J. Winslow*, North Grafton, Massachusetts, September 19, 1912 (N. Eng.); *R. W. Woodward*, low meadows, Franklin, Connecticut, September 25, 1915 (Gray).

Most of the European specimens of *B. connata* are so different in general aspect from the more common forms in America that they have been perplexing to botanists. Their primary leaves are less slenderly and distinctly petiolate than in *B. connata* proper, and

also fewer-toothed, the teeth being usually larger and more irregular. The outer involucral bracts are distinctly foliaceous, the well developed ones being mostly 3–6 cm. long. Indeed, for some time it seemed to certain European botanists that the European plants represented a new form,[1] and Warnstorf did in fact name them *B. tripartita* L. var.? *fallax*, afterwards changing the name to *B. decipiens*. Later, he referred the name *B. decipiens* to *B. connata* Muhl.

In 1915 Fernald and St. John (loc. cit.) described a variety *fultior* from Rhode Island and Massachusetts. Their specimens (Gray) are so closely identical with certain of the European specimens (for example, *Heiland* 876; *C. Warnstorf*, shore of Lake Neuruppin; both in U.V.) that they can scarcely be distinguished. In fact, the only difference which I can find is that several leaves on Fernald and St. John's material are tripartite, a difference seen to be inconsequential as additional specimens have been studied.

Fassett (Rhodora 30: 32. 1928) cites additional specimens and records that "in Wisconsin, var. *fallax* grades into var. *typica*, although some individuals are well marked with bracts 6 cm. long. The few large irregular teeth of the leaves, mentioned both by Fernald and St. John and by Sherff, do not seem to be characteristic of most Wisconsin material."

EXPLANATION OF PLATE LXV

Bidens connata, fig. *d:* leaf, with portion of adjacent stem, ×0.58; from *Lea* 105, in Hb. Field.

Bidens connata var. *petiolata*, figs. *a*, *f–j: a*, flowering specimen, ×0.58; *f*, exterior involucral bract, ×1.74; *g*, interior involucral bract, ×1.74; *h*, palea, ×1.74; *i*, disc floret, ×4.06; *j*, achene, ×4.64; *a*, *f–i*, from *Sherff* 1803, in Hb. Field; *j*, from *Th. Holm*, Brookland, District of Columbia, September 30, 1902, ibid.

Bidens connata var. *fallax*, figs. *b*, *c:* simple and tripartite leaves, ×0.58; from *Fernald, Long, & Torrey* 10688 (type of var. *fultior* Fern. & St. John), in Hb. Gray.

Bidens connata var. *pinnata*, fig. *e:* cauline leaf, ×0.58; from *J. H. Sandberg*, Minnesota, in Hb. Field.

Bidens connata var. *anomala*, fig. *k:* achene, ×4.64; from *Aug. Selby*, Ohio, September 9, 1890, in Hb. Field.

[1] But cf. Baenitz (Oesterr. Bot. Zeitschr. 45: 485. 1895), who merely equated *B. decipiens* Warnst., the European form, with *B. connata* Muhl. of America.

88. **Bidens heterodoxa** Fern. & St. John, Rhodora 17: 23. 1915. Pl. LXVI, figs. *a* and *c–g*.

Bidens tripartita var. *heterodoxa* Fern. ibid. 15: 76. 1913.

Foliorum simplicium lamina vel 3–5-partitorum foliolum terminale anguste lanceolatum vel etiam anguste ovatum, acerrime (vel etiam incise) serratum.

Achaeniorum aristae antrorsum setosae.

B. heterodoxa sensu stricto.

Achaeniorum aristae retrorsum setosae.....var. *β. orthodoxa.*

Foliorum simplicium lamina vel 3-partitorum foliolum terminale oblongo-lanceolatum vel lanceolato-ovatum, grosse ac subacriter dentatum.

Achaeniorum aristae leves vel obscure scabridae. var. *δ. agnostica.*

Achaeniorum aristae retrorsum setosae....var. *γ. Monardaefolia.*

Herba annua, erecta, glabra, 1.5–9 dm. alta; caule subtetragono, purpurascenti. Folia membranacea, simplicia vel 3–5-partita, petiolata petiolis 0.5–4 cm. longis et saepe subalatis; lamina vel foliolo terminali lanceolato vel anguste ovato, 2.5–12 cm. longo, argute grosseque serrato vel etiam inciso-dentato. Capitula discoidea vel debiliter radiata, ad anthesin 7–12 mm. lata et 5–8 mm. alta, pedunculata pedunculis tenuibus et 1–5 cm. longis. Involucrum glabrum vel sparsim hispidum; bracteis exterioribus 3–6, late linearispathulatis, foliaceis, elongatis, interdum sparsim ciliatis, 1–2 cm. longis; interioribus oblongis vel ovato-lanceolatis, 7–9 mm. longis. Flores ligulati (saepe deficientes) flavi, ligula oblanceolati vel oblongo-obovati, ± 4 mm. longi. Achaenia plana, strigosa, duabus faciebus unicostata, plerumque 2–4-aristata, margine aristisque antrorsum barbellatis; marginalia cuneata, 4–5 mm. longa et 1.8–2 mm. lata, aristis 1.5–2 mm. longis; interiora paulo angustiora, 6–7 mm. longa, aristas 2–3 mm. longas gerentia.

Type specimen: Collected by *Merritt L. Fernald, Bayard Long, & Harold St. John*, No. 8206, border of salt marsh, Bunbury, Prince Edward Island, August 28, 1912 (Gray, 3 sheets).

Distribution: Prince Edward Island.

Specimens examined: *Fernald, Long, & St. John* 8205, fresh, spring-fed marsh, Southport, Queens Co., Prince Edward Island, August 22, 1912 (Field; Gray, 2 sheets); *iidem* 8206 (type, Gray, 3 sheets: cotype, Field); *iidem* 8207, border of salt marsh, Bunbury, Queens Co., Prince Edward Island, August 28, 1912 (Field; Gray); *iidem* 8317, sandy sea strand at the Narrows, Alright Isl., Magdalen

BIDENS TRIPARTITA var. REPENS (D. Don) Sherff (figs. *a–f*)
BIDENS LINEARILOBA Oliv. (figs. *g–o*)

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Isls., Quebec, August 21, 1912 (Gray); *Fernald & St. John* 11210, border of a fresh pond (recently an arm of the sea), back of sand hills, Tracadie, Prince Edward Island, August 22, 1914 (Gray).

A rather enigmatic species as yet. It is one that from its general habit might easily be confused with *B. connata* Muhl. vars. *typica*, *fallax*, and *petiolata*. The achenes, however, are consistently flat and frequently only 2- (instead of 4-) awned, whereas "a check-study of *B. connata* and its varieties shows that in that species all well developed central achenes of the heads are consistently 4-awned and with the highly developed mid-ribs becoming almost wing-like in maturity" (Fernald, op. cit. 19: 258. 1917). The wide gap in distributional ranges between those of the species proper with its var. *orthodoxa* and those of the vars. *Monardaefolia* and *agnostica* might at first excite suspicion as to the specific identity of the two sets of forms. Such gaps are common, however, for the region in question (vide Fernald, loc. cit.).

Bidens heterodoxa var. *β*. **orthodoxa** Fern. Rhodora 17: 24. 1915. Pl. LXVI, figs. *b* and *h*.

Var. aristis achaeniorum retrorsum setosis.

Type specimen: Collected by *Fernald, Long, & St. John*, No. 8203, shallow water near margins of brackish ponds, southwest of Etang du Nord Village, Grindstone Island, Magdalen Islands, Quebec, August 15, 1912 (Gray, 2 sheets).

Distribution: Magdalen Islands, Quebec.

Specimens examined: *Fernald, Long, & St. John* 8203 (type, Gray, 2 sheets: cotype, Field); *iidem* 8204, boggy margin of the strand at the Narrows, Alright Isl., Quebec, August 21, 1912 (Field; Gray).

Bidens heterodoxa var. *γ*. **Monardaefolia** Fern. Rhodora 19: 259. 1917.

Planta racemose ramosa, ramis brevibus axillaribusque. Folia longe petiolata, simplicia vel 3-partita, laminis vel lobis terminalibus oblongo-lanceolatis vel lanceolato-ovatis, grosse dentatis. Achaeniorum aristae retrorsum setosae.

Type specimen: Collected by *Richard W. Woodward*, strand of Pocotopaug Lake, Chatham, Connecticut, September 21, 1915 (Gray, 10 sheets).

Distribution: Known only from type locality in Connecticut.

Specimens examined: *N. C. Fassett* 2369 pro parte, shores of Pocotopaug Pond (Lake), Chatham, October 12, 1924 (N. Eng.,

cum var. *agnostica* commixta); *idem* 2370, eodem loco et tempore (N. Eng., 2 sheets); *Woodward*, eodem loco, September 21, 1915 (type, Gray, 10 sheets: cotypes, N. Eng., 2 sheets).

The foliage of this and the next following variety offers a strong general resemblance to that of certain well-known species of *Monarda* (e.g., *M. didyma* L. and *M. fistulosa* L.).

Bidens heterodoxa var. δ. **agnostica** Fern. Rhodora 19: 259. 1917.

Habitus foliaque ut apud var. *Monardaefoliam*. Achaeniorum aristae leves vel obsolete scabrae.

Type specimen: Collected by *Richard W. Woodward* and *Charles Humphrey Bissell*, strand of Pocotopaug Lake, Chatham, Connecticut, September 21, 1910 (Gray).

Distribution: Known only from type locality in Connecticut.

Specimens examined: *N. C. Fassett* 2369 pro parte, shores of Pocotopaug Pond (Lake), Chatham, October 12, 1924 (N. Eng., cum var. *Monardaefolia* commixta); *R. W. Woodward*, eodem loco, September 21, 1915 (Gray, 5 sheets).

EXPLANATION OF PLATE LXVI

Bidens heterodoxa, figs. *a*, *c–g*: *a*, flowering and fruiting branch, ×0.61; *c*, exterior involucral bract, ×4.88; *d*, interior involucral bract, ×4.88; *e*, palea, ×4.88; *f*, disc floret with submature achene, ×4.88; *g*, achene, ×4.88; all from *Fernald, Long, & St. John* 8205, in Hb. Field.

Bidens heterodoxa var. *orthodoxa*, figs. *b*, *h*: *b*, small flowering plant, ×0.61; *h*, achene, ×4.88; both from *Fernald, Long, & St. John* 8204, in Hb. Field.

89. **Bidens tripartita** L. Sp. Pl. 831. 1753. Pl. LXVII, figs. *a*, *b*, and *d–i*.

Bidens nodiflora L. op. cit. 832 (*B. nudiflora* Steud. Nom. ed. 2, sphalm).

Bidens tripartita var. β. *flore radiato* Zinn, Cat. Hort. Ager. Goett. 406. 1757.

Bidens tripartita var. β. *pumila* Retz. Observ. 55. 1774; ed. 2. fasc. 1: 28. 1791; Retz. Prodr. Fl. Scand. 154. 1779.

Bidens cannabina Lam. Fl. Fr. 2: 44. 1778.

Bidens frondosa var. α. Lam. Dict. Bot. 1: 413. 1789.

Bidens effusa Thuill. in Hb. Del.

Bidens tripartita var. β. *Conyza palustris* (Loes.) Willd. Sp. Pl. 3: 1716. 1804.

BIDENS RADIATA Thuill. (figs. *a–g*)
BIDENS TRIPARTITA var. ORIENTALIS (Velen.) Sherff (figs. *h–n*)

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Bidens pumila (Retz.) Steud. Nom. ed. 1: 108. 1821.

Bidens tripartita var. β. *minima* Lej. Rev. Fl. Spa 171. 1824; cf. Wirtgen, Fl. Reg. Cobl. 97. 1841; Fl. Preuss. Rheinprov. 246. 1857; Wimmer, Fl. Sches. Preuss. Oesterr. Anth. 216. 1841.[1]

Bidens tripartita var. α. *major* Wimmer & Grabowski, Fl. Siles. 2: 118. 1829.

Bidens tripartita var. β. *minor* Wimm. & Grabowski, loc. cit.

Bidens cernua var. *tenuis* Turcz. ex DC. Prodr. 5: 594. 1836.

Bidens tripartita var. δ. *tenuis* (Turcz. ex DC.) DC. loc. cit.

Bidens cannabina Tausch, Flora 19: 396. 1836.

Bidens tripartita var. *integra* Peterm. Fl. Lips. 602. 1838.

Bidens tripartita var. α. *discoidea* Wimmer, Fl. Sches. Preuss. Oesterr. Anth. 216. 1841.

Bidens tripartita var. β. *radiata* Wimm. loc. cit.; Willd. ex Beckhaus, Fl. Westf. 582. 1893.

Bidens pygmaea [pro var.!][2] Kittel, Deutschl. Fl. ed. 2. 702. 1844.

Bidens tripartita var. β. *integrifolia* Wirtgen, Fl. Preuss. Rheinprov. 246. 1857.

Bidens tripartita f. *minima* (Wirtg.) Larsson, Fl. Werml. o. Dal 221. 1859.

Bidens tripartita var. *glareosa* Schz. Bip. in Hb. Par.

Bidens tripartita var. β. *ramosissima* Schz. Bip. in Hb. Mus. V.

Verbesina tripartita (L.) Ruprecht, Fl. Ingrica 1: 563. 1860.

Pseudohepatorium foemina Dodon. ex Ruprecht, op. cit. 564.

Verbena supina Trag. ex Ruprecht, loc. cit.; cf. Kirschleger, Fl. Vog.-Rhén. 1: 364. 1870.

Bidens tripartita subvar. *minima* (Wirtg.) Coss. & Germ. Fl. Par. ed. 2: 487. 1861.

Bidens tripartita var. *ruderalis eutripartita* Schur in Hb. Kew.

Bidens tripartita var. α. *eutripartita* Schur in Hb. U. S.

Bidens tripartita var. *heterophylla* Schur in Hb. Par.

Bidens tripartita var. *simplex* Schur in Hb. Gray.

[1] For a discussion of var. *minima* Huds. (Fl. Angl. ed. 2: 355. 1778), which is referred to *Bidens cernua* L., see p. 298, footnote 4.

[2] Kittel, in accordance with his peculiar custom of avoiding the prefix "var." and using the generic initial, used the name *B. pygmaea*. It is clearly evident in his text, however, that he meant a variety, not a species. But cf. Briq. & Cavill. (Fl. Alp. Marit. 6: 217. 1917), who fail to discriminate in this respect. (Really, Kittel's omission of the designation "var." is, by itself, unimportant, since such eminent botanists as Linnaeus and Augustin DeCandolle—to name only two examples—likewise omitted it, using merely a Greek letter. In the main body of their text, however, they repeatedly referred to their lettered forms as *varieties*.)

Bidens arenicola Gandoger, Fl. Lyon. 122. 1875.

Bidens arenaria Gandoger, loc. cit.

Bidens tripartita var. *a. typica* Beck v. M. Fl. Nied. Oesterr. 2, 2: 1191. 1893 (exclud. synon. *B. hybrida* Thuill.).

Bidens tripartita var. *minor* f. *pumila* (Retz.) Roth ex Beck v. M. loc. cit.

Bidens tripartita var. *minor* f. *integra* (Peterm.) Koch ex Beck v. M. loc. cit.

Bidens tripartita var. *cannabina* (Lam.) Beckhaus, Fl. Westf. 582. 1893.

Bidens tripartita var. *β. indivisa* Corbière, Nouv. Fl. Norm. 316. 1893.

Bidens tripartita f. *stolonifera* Bolzon, Nuov. Giorn. Bot. Ital. 1895: 323. 1895.

Bidens bipartita L. ex Hálacsy, Conspect. Fl. Graec. 2: 578. 1902 (sphalm).

Bidens tripartita var. *a. genuina* Rouy, Fl. Fr. 8: 218. 1903.

Bidens tripartita var. *latifolia* Rouy, loc. cit.

Bidens tripartita var. *minor* subvar. *pumila* (Retz.) Rouy, loc. cit.[1]

Bidens tripartita f. *gigantea* Evers in Hb. Mus. V.

Bidens tripartita var. *cannabina* (Lam.) Tausch ex Fiori in Fiori & Paoletti, Fl. Anal. Ital. 3: 302. 1904.

Bidens tripartita var. *reptans* Caldesi ex Fiori, loc. cit. (fide Fiori).

Bidens tripartita f. *pumila* (Retz.) Roth ex Briq. & Cavill. Fl. Alp. Marit. 6: 217. 1917.

Bidens tripartita subvar. *pumila* (Retz.) Rouy ex Briq. & Cavill. op. cit. 217 and 327.

Bidens tripartita subsp. *eu-tripartita* Briq. & Cavill. op. cit. 216.

Bidens tripartita subsp. *eu-tripartita* var. *major* Wimm. & Grab. ex Briq. & Cavill. op. cit. 216 and 327.

Bidens tripartita subsp. *eu-tripartita* var. *pumila* (Retz.) Roth ex Briq. & Cavill. op. cit. 217 and 327.

Bidens tripartita subsp. *eu-tripartita* var. *pumila* f. *integra* (Peterm.) Koch ex Beck v. M. ex Briq. & Cavill. op. cit. 217 and 327.

a. Achaenia marginibus levia vel tantum parce retrorso-hamosa. ..... var. *γ. repens.*

a. Achaenia marginibus valde retrorso-hamosa.

b. Folia principalia plerumque indivisa.

c. Folia oblongo-lanceolata ..... var. *β. cernuaefolia.*

[1] For a discussion of hybrids between *B. tripartita* and *B. radiata* see p. 294.

BIDENS TRIPARTITA var. HIRTA (Jord.) Sherff

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c. Folia subovata ..... var. ε. *hirta.*

b. Folia principalia normaliter 3–5-partita.

c. Achaenia corpore exteriora 5–6 mm. longa et 2.2–2.5 mm. lata, interiora 6–7.5 (–8.5) mm. longa et 1.5–2 mm. lata. *B. tripartita* sensu stricto.

c. Achaenia corpore exteriora 4–4.5 mm. longa et 2.2–2.5 mm. lata, interiora circ. 4.5 mm. longa et 1.5–2 mm. lata. var. δ. *orientalis.*

Herba erecta, annua, saepius 2–7 (interdum gigantea et usque ad 20, interdum minima et tantum 1–2) dm. alta; caule subtetragono, glabro, gracili vel subgracili, virente vel valde purpurascente, ramoso; ramis subtenuibus, laxis. Folia breviter petiolata petiolis marginatis usque ad 1.5 cm. longis, petiolo adjecto principalia plerumque 3–9 cm. longa, pallida vel laete viridia; inferiora simplicia lanceolata dentataque; superiora medianaque normaliter 3- vel 5-partita, segmentis membranaceis ovatis vel lanceolatis, acutis vel longe angusteque acuminatis, irregulariter paucidentatis, segmento terminali tripartitorum simplici vel basi lobis duobus lateralibus interne saepius integris externe 1–2-dentatis instructo; summa lanceolata, simplicia vel trifida; omnia subtus parce hirtula et margine ciliata. Capitula solitaria ad terminos ramulorum, discoidea vel rarissime subradiata disco demum circ. 1–2 cm. lata (bracteis exterioribus exclusis) et circ. 1–1.5 cm. alta, pedunculata pedunculis tenuibus plerumque usque ad 4 cm. longis. Involucrum basi glabrum vel pubescens; bracteis exterioribus 5–9, foliaceis, linearibus vel lanceolatis, integris vel dentatis, acutis vel anguste acuminatis, margine setoso-ciliatis, patulis, 1–3.5 cm. longis; interioribus ovatis vel ovato-lanceolatis, apice obtusis vel breviter acuminatis, 6–9 mm. longis. Achaenia obovato-cuneata, obcompressa, brunnea vel subatra, ad margines et rarissime ad costam medianam retrorsum hamosa, alibi glabra vel apicem versus sparsissime pilosiuscula, corpore exteriora 5–6 mm. longa et 2.2–2.5 mm. lata, interiora 6–7.5 (–8.5) mm. longa et 1.5–2 mm. lata, omnia biaristata vel saepe imperfecte triaristata (rarissime quadriaristata); aristis suberectis, brunneis vel purpurascentibus, retrorsum hamosis, duabus principalibus 2–3.5 mm. longis.

Type specimen: In the *Hortus Cliffortianus* set (Brit.; for more extended discussion see following text and especially p. 276, footnote 1).

Distribution: Eastern hemisphere. In Eurasia from northern Ireland through Norway, Sweden, Finland, Turkestan, southeastern Siberia to Japan and even to Kamchatka Peninsula, southward to

France, Italy, Turkey, Persia, and British East India. In the Philippine Islands. Rare in northern Africa (Algeria, etc.). In southeastern Australia (New South Wales).[1]

Specimens examined: *N. Alboff* 460, alt. 600 meters, Abkhasia, Trans-Caucasia, October 14, 1893 (Boiss.); *anon.*, Sakawa, Isl. Shikoku, Japan, October 10, 1890 (Berl.); *B. Balansa*, moist ground, vicinity of Rehitze, Dist. Lazistan, Asiatic Turkey, September, 1866 (Del., 2 sheets; Mus. V.); *John Ball*, near Belfast, Ireland, August, 1837 (Mo.); *idem*, Dromtine Lough and Sneem, Kerry Co., Ireland, September 22, 1859 (Mo.); *idem*, vicinity of Colico, near Lake Como, Italy, August 21, 1863 (U.S.); *A. Bennett* 107, Croydon, Surrey, England, 1881 (Barn.); *Henri Bernet*, ditches, Geneva, Switzerland, August, 1860 (Boiss.); *C. Billot* 2866 (collected by *Moniez*), wet places at Louhans, Saône-et-Loire, France, September, 1860 (U.S.); *idem* 2866*bis* (collected by *G. E. Paris*), in radish field, very wet soil, near Chambéry, Savoie, France (U.S.); *Blau* 2012, Bosnia, September 10, 1869 (Berl.); *Addison Brown*, ballast near Communipaw Ferry, New Jersey, July 3, 1880 (N.Y.); *P. & E. Carlström* (*Reliq. Mailleanae* 1267), in swampy places, vicinity of Stora-Schedwic, Dist. Dalecarlia (Dalarne), Sweden, August 28, 1862 (Burn.; Cop.; Del.; D.U. Prag.; Kew; Par., 2 sheets); *Fr. Castella*, edge of road, alt. about 800 meters, Ramont, toward Lussy, Fribourg, Switzerland, September 5, 1905 (U.S.); *G. von Cederwald*, Holm, Sweden, 1866 (Gray); *J. F. Collins, M. L. Fernald, & A. S. Pease*, damp hollow in arbor-vitae swamp, Percé, Quebec, August 16–20, 1904 (Gray); *iidem* 6175, towards Cap Blanc, Percé, August 16–20, 1904 (Gray); *E. Cosson*, Prov. Constantine, Algeria, July 17, 1861 (Cop.); *N. H. Cowdry* 1015, side of moat, very common, Peking, China, September, 1919 (Kew); *Dimonie*, Macedonian region, European Turkey, July, 1908 (Mus. V.); *O. Duhmberg* 278, Altai, Siberia, 1881 (Berl., 3 sheets); *idem* 419, eodem loco, 1881 (Berl.); *Evers* 476, shady ditches near Madonna Mariellina, September 6, 1903 (Mus. V., sub inscript. "f. *gigantea* bis Mannshoch"); *Faber*, damp roadsides, Hai City, Manchuria, 1891 (Berl., 2 sheets); *Urbain Faurie* 162, Shonai, Japan, September 22, 1897 (Berl.; U.V.); *idem* 417, common in herb-covered places, Fusan, Corea, October 4, 1901 (Berl.); *idem* 1171, Mombetsu, Japan, September 27, 1887 (Kew, 2 sheets);

[1] *Bidens tripartita* was cited by Bigelow for Massachusetts (Fl. Bost. ed. 2. 294. 1824), but Bigelow's plant was the tripartite-leaved form of *Bidens connata* Muhl. *B. tripartita* is not known to me from the western hemisphere, but doubtless occurs in the eastern United States about ballast and waste heaps. Fassett (Rhodora 27: 185. 1925) includes it for eastern North America.

BIDENS AMPLISSIMA Greene

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idem 3372, Aomori, Japan, October, 1899 (Berl.; var. *cernuaefoliae* adpropinquans); *idem* 4083, in wet places, near Aomori (Berl.); *idem* 4854 and 4855, in marsh, Kushiro, Japan, September 19, 1889 (Kew); *idem & J.-B. Verlot* 4916, ditches, near Grenoble, Isère, France, September, 1885 (Boiss.); *Fiori*, near Modeno, Italy, September 9, 1885 (Berl.); *O. R. Fries* (fasc. 16, no. 1), Upsala, Sweden, 1858–1864 (Berl.; Boiss.); *H. A. Fröding*, Vermland, Sweden, August 22, 1904 (Calif.); *Gandoger* (sine num.), Arnas, Rhône, France, September, 1872 (Mus. V.); *idem* 599, gravels of the Saône River at Anse, Rhône, France, August 6, 1866 (Kew, sub nom. *B. arenaria*); *idem* 600, glades, Nousols (Monsoult, Department Seine-et-Oise?), France, August 19, 1858 (Kew, sub nom. *B. glaberrima*); *idem* 967, Arnas, near Villefranche, Rhône, France, August 11, 1869 (sub nom. *B. arenaria* Gandog. Fl. Lyon. 122: Mo.; U.V.); *Giuseppe Giraldi* 274, hill at Fu-kio, northern Shen-si, China (Berl.); *idem* 3059, Ki-fon-san, northern Shen-si, China, September, 1899 (Berl.); *Grantzow*, Prenzlau (Hindenburg), Prussia, August, 1876 (Mus. V., sub nom. *B. cernua* × *tripartita*);[1] *A. A. Hamilton*, Centennial Park, New South Wales, March, 1909 (Mus. V.); *Heinrich Handel-Mazzetti*, Gotzeus bei Innsbruck, Austrian Tyrol, August, 1897 (U.V.); *C. Haussknecht* (*Iter Syriaco-Armenicum*), alt. 450 meters, ditches about Maranh, August 22, 1865 (Mus. V.); *Hass* 17, alt. 30 meters, Kiao-chau (Kiautschou), Prov. Shan-tung, China, October 10, 1905 (Berl.); *Hayek* 3795 p.p., calcareous soil, alt. 330 meters, Hochenegg, southern Styria (Steiermark), Austria (Gray); *A. Henry* 9903, rice fields below Pan-Zu-Lua, Mengtse (Meng-tsz, Prov. Yun-nan), China, November 19 (N.Y.); *H. Hollmén* 384*a*, in ditch connected with the sea, near Abo, Finland, August 28, 1885 (Berl.; Cop.; Del., 2 sheets; Mo.; U.V.); *idem* 384*b*, Nystad, Birkholm, Huvilanlahti, Finland, August, 1881 (Berl.; Cop.; Del.; Mo.; U.V.);[2] *Jeanpert* 1202, ditches, Saint-Denis, Seine, France, September 19, 1901 (Boiss.; foliis indivisis); *Karl Keck*, Aistershaim, Upper Austria, August 23, 1861 (U.V.); *idem*, ditches near Aistershaim, August, 1889 (U.V.); *Louis Keller*, bushy, swampy places, vicinity of Vienna,

[1] *Grantzow* 876 (Mus. V.) likewise came from Prenzlau and likewise was regarded by Grantzow as being a hybrid between *B. cernua* and *B. tripartita* and he remarks in both cases that he found his (supposed) hybrids "nur unter den Eltern." The leaves are indeed almost simple, somewhat suggesting *B. cernua*, but the general aspect and fruit characters are those of *B. tripartita*. (Elsewhere in herbaria, normal specimens of *B. radiata* have been carelessly taken for hybrids between *B. cernua* and *B. tripartita*.)

[2] From Hollmén's printed label is taken the following: "In Finlandia australi usque ad c. 62° frequenter aut frequentissime obvius, in australi parte Finlandiae mediae ad c. 63° haud frequens. In vicinitate Sinus Bottnici ad c. 64° progreditur."

Austria, August 28, 1880 (Mus. V., 2 sheets); *W. A. Kellerman*, Goettingen, Germany, August 23, 1879 (U.S.); *A. Klammerth* 1268, in fields at Aschbach near Wegscheid, Bavaria, August, 1911 (Berl.; Mus. V.; U.V.); *T. A. Knapp*, along brook, Hasanbeili, Persia, September 19, 1884 (U.V.); *V. L. Komarόv* 1535 p.p., River Mu-dandsian, Manchuria, September 19, 1896 (Berl., sub nom. var. *limosa* Kom.; plantis tantum circ. 1.5 dm. altis, achaeniorum immaturorum marginibus retrorsum spinulosis); *idem* 3291 p.p., Kamtchatka Peninsula, August 27, 1909 (Mus. V., forma valde pumila et var. *orientali* adpropinquans, foliis simplicibus longo-lanceolatis, achaeniis parvis submaturis subnigris); *Fr. Körnicke*, Leningrad, Russia, August, 1857 (Berl., 2 sheets); *idem*, on the Karposka, at the Botanical Garden, Leningrad, September, 1857 (Berl.); *Th. Kotschy* (*Pl. alepp. kurd. moss.*) 457, Asiatic Turkey (Berl.; Mus. V., 3 sheets, forma paucis foliis tripartitis); *B. Krug* 454, alt. 600 meters, Lauschan Mountains, Kiao-chau (Kiautschou), Prov. Shan-tung, China, September, 1910 (Berl.); *idem* 631, iisdem montibus, 1905 (Berl.); *A. Loher* 3637, Trinidad, central Luzon, Philippine Islands (Kew); *Maximowicz* (*iter secund.*), Hakodate, Japan, 1861 (Cop.; Mus. V.); *idem* (*iter secund.*), Yokohama, Japan, 1862 (Berl.; Gray); *Meisner*, near Geneva, Switzerland, September 14, 1826 (N.Y.); *K. Menjabe*, Azuma, Prov. Iburi, Japan, August 22, 1884 (Gray); *Moniez* 2866 (vide *C. Billot* 2866); *H. Mortensen*, Denmark, September 15, 1888 (Mo.); *M. F. Müllner*, shore of stream at Penzing, Austria, September 6, 1876 (Mus. V.); *Mustafa* 490, Noi, Kurdistan, Asiatic Turkey, 1874 (Kew); *J. Natsumura*, Tokyo, Japan, September 30, 1879 (U.V.; nomen japonicum, Tokogi); *R. Oldham* 411 pro parte, Nagasaki, Japan, 1862 (Boiss.; Cop.; Kew; Mun.); *J. Paczoski*, Pereiaslaf, Poltava, Little Russia, August 21, 1891 (Boiss.); *idem*, Kamienka, Distr. Gorodnia, Chernigof, Little Russia, July 9, 1892 (Boiss.); *Ove Paulsen* 2141, forest, Piribasar near Enseli, Prov. Gilan (Ghilan), Persia, 1899 (Cop.); *Petermann*, vicinity of Leipsic, Germany (Mus. V., 15 specimina, tantum 7–12 cm. alta et sub nom. var. *minima* Peterm.); *K. Petersen*, Christiania, Norway, 1888 (Mus. V.); *F. Petrak* 691, ditches in meadows, Weisskirchen, Moravia, Czechoslovakia, August, 1911 (Gray); *G. N. Potanin*, plain about Kuku-hoton, Ordos, Mongolia, August 23, 1884 (Mus. V.); *idem*, in marshes, eodem loco, August 25, 1884 (N.Y.); *E. Preissmann*, alt. 600 meters, Marienbad, Bohemia, August 15, 1915 (Mus. V.); *A. Regel*, Kara Kul (Karakol) and Ala-tau, Turkestan, September, 1876 (Kew, achaeniis var. *orientali* adpropinquans); *P. F. Reinsch*

304, Erlangen, Bavaria, September 1, 1900 (Del.); *Aladár Richter*, between Taga and Sucutard, Prov. Transsilvania, Roumania, August 30, 1901 (Cluj, 2 sheets); *A. V. Rosthorn* 1049, Nan-chuan, Prov. Sze-chuan (Szechuen), China, 1891 (Berl.); *De Sardagna*, Valle del Sale, Trent, southern Tyrol, September 4, 1878 (U.V., 2 sheets); *Schlagintweit* 866, alt. 2,070–2,250 meters, environs of Skardo, Prov. Balti, Tibet, August 6–September 4, 1856 (Gray); *Fr. Schlanbusch*, vicinity of Alingsas, Sweden, July, 1893 (Cop.); *Schrenk*, Sungaria (Berl. ex Petrop.); *C. H. Schultz Bipontinus*, Erlangen, Germany, 1826 (Mus. V.); *Schur* 2001*a*, Brünn, Moravia, July, 1870 (U.S., sub nom. *a. eutripartita* Schur); *idem* 2001 (*c*? non distincte scriptum), among rubbish, Vienna, Austria, August 30, 1867 (Kew, sub nom. var. *ruderali eutripartita*); *A. Schweinfurth*, Nijni-Novgorod, Great Russia, July, 1863 (Berl., 1 interiore achaenio 4-aristato); *Fr. Sennen* 2687, alt. 1,150 meters, prairie ditches, Caldegas, Cerdagne, Spain, September 11, 1916 (Burn., sub nom. *B. tripartita* var. *biaristata* Sennen); *idem & Fr. Septimin* 178 p.p., ditches, Fortia to Fortianell, Catalonia, Spain, October, 1906 (Burn.); *T. Symonowiczówna* 737, Minojty, Dist. Lida, Lithuania, 1898 (Berl.; Mus. V.; U.V.); *Tanaka* 20, Japan (Mus. V.); *Taquet* 1028, in rice fields, Hongno, Isl. Quelpaert (Quelpaerd), Corea, October 15, 1908 (Berl.; Del.); *Telsman* 48, Dittmannsdorf, Silesia, August, 1889 (U.V.); *T. Thomson*, alt. 1,500–1,800 meters, Kashmir, British East India (Boiss.; Cop.; Del.; Gray; Kew; Mus. V.); *J. L. Thuillier*, Etang de St. Hubert, France (Del., sub nom. *B. effusa;* forma parva valde ramosa); *idem* (Del., sub nom. *B. tripartita;* auctoris specimen, Fl. env. d. Paris ed. 2. 1799); *Tokubuchi*, Horomambetsu, Prov. Hidaka, Japan, August 20, 1892 (Mo.); *L. A. Waddell*, alt. 3,600 meters, Lhasa, Tibet, September 15, 1904 (Kew); *K. Watanabe*, Sakawa, Isl. Shikoku, Japan, October 11, 1888 (Gray); *H. C. Watson*, North Surrey, England, 1865 (Carn.); *N. Zelenetzuy*, Simferopol (Sympheropol), Crimea, June 1, 1885 (Boiss.).[1]

The historical setting of *Bidens tripartita* L. is very definite and admits of no doubt—fortunately so, since Linnaeus (loc. cit.) made it the first or type species of his genus *Bidens*. Linnaeus' original description ("Bidens corollis flosculosis, calycibus subfoliosis, seminibus erectis, foliis trifidis") is rather meager. However, his first cited synonym refers directly to the Hortus Cliffortianus. The

[1] The juice of this species dyes cloth yellow (Lightfoot, Fl. Scot. 1: 462. 1777; Gray, Brit. Pl. 2: 448. 1821; J. E. Smith, Engl. Fl. ed. 1. 3: 399. 1825; W. Baxter, Brit. Flow. Pl. 6: 446. 1843). "It is very acrid and when chewed, excites salivation" (Baxter, loc. cit.; cf. Gandoger, Fl. Lyon. 122, concerning *B. arenaria*. 1875).

original Hortus Cliffortianus specimen is still in an excellent state of preservation (Brit.)[1] and this, together with the main specimen[2] of the Linnean Herbarium, is seen to be the common, usually purple-stemmed species known to practically all European writers since the days of Linnaeus as *B. tripartita*.

Much confusion has arisen in literature concerning *Bidens nodiflora* L. The name was founded by Linnaeus directly upon "Bidens nodiflora, brunellae folio" in Dillenius, Hort. Elth. 52, *pl. 44, f. 52*. This Dillenian plant was clearly illustrated and was a form of *Bidens tripartita* L. The Linnean Herbarium has Linnaeus' own specimen of *Bidens nodiflora* L. and the resemblance to the Dillenian plate (No. 44) is very close. It happens, however, that Dillenius had given another plate with the name "Bidens nodiflora folio Tetrahit" (op. cit. *pl. 45, fig. 53*) and in that plate was shown the plant later named *Synedrella nodiflora* by Gaertner. The use by Dillenius of the name *nodiflora* for these two unlike species led subsequently to confusion. Thus many instances are found in which "*Synedrella nodiflora* (L.) Gaertn." is erroneously given and it must be noted here that Linnaeus should in no way be accredited with this name in *Synedrella*.

Many writers have sought to segregate, under such names as var. *pygmaea*, var. *pumila*, etc., the tiny dwarfed plants often produced by *B. tripartita* under adverse conditions. As dwarfed forms can be evoked, under certain conditions, in practically every species of phanerogam, the maintenance of such names as var. *pygmaea*, var. *pumila*, etc. (as also of such names as var. *normalis*, var. *typica*, etc.), seems of little value. Thus, in all cases in which a varietal or even specific name rests upon a form which clearly is *B. tripartita* but has not had opportunity to grow to normal size, I have reduced the name to synonymy, viz.: var. *pumila* Retz.; *B. pumila* (Retz.) Steud.; var. *minor* Wimm. & Grab.; var. *integra* Peterm.; var. *minima*

[1] Its label reads, "*Chrysanthemum. Cannabinum aquaticum folio tripartitum diviso. H. L. Bidens foliis tripartito divisis Caesalp.* 488, *Bidens tripartitus.*" In the Hortus Cliffortianus (p. 399. 1737) Linnaeus placed this with var. α. of his first species of *Bidens* and gave *Bidens foliis tripartito divisis* Caesalp. syst. 488" as his first synonym. But if we discard the Hortus Cliffortianus herbarium specimen and go back to the work of Caesalpinus (De Plantis 16: 488, cap. XVII. 1583), we meet with the same species.

[2] From which my plate is largely taken. A second sheet in the Linnean Herbarium is pinned to the main or first sheet and bears a smaller specimen raised from seed in the Garden of Upsala (Hort. Upsal.). This smaller specimen is specifically identical. (Concerning the status and authenticity of the main or larger specimen as representing Linnaeus' concept, cf. B. Daydon Jackson, Proc. Linn. Soc. 124th Session, suppl.—Index Linn. Herb.—: 8, sub num. 1; 25, sub Explanation; 44, sub Bidente tripartita, 1. 1912.)

BIDENS CERNUA L. (figs. *a*, *d–k*); var. OLIGODONTA Fern. & St. J. (figs. *b*, *c*)

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Wirtg.;[1] var. *pygmaea* Kittel; var. *integrifolia* Wirtg.;[2] f. *minima* (Wirtg.) Larss.;[3] subvar. *minima* (Wirtg.) Coss. & Germ.; var. *minor* f. *pumila* (Retz.) Roth ex Beck von M.; var. *minor* f. *integra* (Peterm.) Beck von M.; var. *indivisa* Corb.; var. *minor* subvar. *pumila* (Retz.) Rouy.[4] Similarly, all cases of self-evident duplication have been treated by reduction to synonymy, viz.: var. *major* Wimm. & Grab.; var. *discoidea* Wimm.; var. *typica* Beck von M.; var. *genuina* Rouy.

B. cannabina Lam. was a substitute name[5] used by Lamarck for *B. tripartita* L., which he cited, along with "Bidens foliis tripartito divisis Tournef. 462," as synonymous. *B. frondosa* var. *a*. Lam. is likewise referable, by straight synonymy, to *B. tripartita*.

Rarely *B. tripartita* has a few minute ray flowers. Loeselius (Fl. Pruss. 53, *pl. 10*. 1703) was apparently the first to publish an illustration of this rare radiate form, using the name, "*Conyza palustris*, foliis tripartito-divisis." In 1757, Zinn (loc. cit.) listed it as var. *β*. flore *radiato*. Later, Vitman (Summa Pl. 4: 458. 1790) noted this form ("Petal. luteo-fusca. *Var. fl. radiato*") and, still later, Willdenow (loc. cit.) employed the name "var. *β. Conyza palustris*" (Loes.) Willd. In 1836, Tausch (loc. cit.) used again the name *B. cannabina* for the common discoid form of *B. tripartita* and treated *Conyza palustris*, etc., of Loeselius as synonymous. Certain authors (e.g., Mérat, Rev. Fl. Par. 251. 1843) appear to have misconstrued the import of Tausch's equation of the two names, thinking that his *B. cannabina* was meant as a name given particularly to the radiate form of *B.*

[1] In his treatment of *B. tripartita* L., Wirtgen rejected *B. minima* Huds. ("*B. minima* L."), placing this latter form rather as a variety of *B. cernua* L. In 1841, it will be observed, both Wimmer and Wirtgen published the name var. *minima*. As Wirtgen's var. *minima* is apparently the first to rest *purely* upon the dwarf *B. tripartita* form, I have credited him rather than Wimmer or the earliest writers in the subsequent combinations; e.g., f. *minima* (Wirtg.) Larss.

[2] Wirtgen's short description ("mit ungetheilten lanzettl. Bl., etwas entfernt vom Wasser") stresses the simple, lanceolate leaves of plants in drier habitats and omits mention of any dwarf habit, although of course his description could refer only to the more or less dwarfed forms. We may note, in passing, that K. Beckhaus (Fl. Westfal. 582. 1893) credits Celakovsky with the authorship of the varietal name *integrifolia* but it is doubtful if Celakovsky's use of this name antedates Wirtgen's.

[3] As stated elsewhere (Bot. Gaz. 64: 31. 1917), Druce (Fl. Berks. 283. 1897) treated this dwarf form as forma *minima*, with the idea apparently that such treatment was new. Evidently he was unaware of Larsson's much earlier use of the name.

[4] In addition may be mentioned var. *β. auriculata* Tausch (Flora 19: 396. 1836). It was described rather briefly: "foliis plerisque integris, inferioribus 1–2-auriculatis." It is apparently a mere dwarfed form of the species proper.

[5] Evidently taken from one of the pre-Linnean synonyms cited by Linnaeus. Cf. Cannabina aquatica folio tripartito diviso C. Bauhin. Pin. ed. 2. 321. 1671.

tripartita. Tausch's description ("floribus discoideis. . . .") shows, of course, that he used the name *B. cannabina* mainly for the common discoid form.[1] Beckhaus (loc. cit.) reduces the name *cannabina* to varietal rank under *B. tripartita*, but without good reason.

The rare radiate form is by a few authors separated as var. *radiata* Wimm. Beckhaus (loc. cit.) reports that it once was found at Bielefeld, Prussia.[2] Var. *tenuis* (Turcz. ex DC.) DC. is merely a small form or state of the species "capitulis paucifloris, foliis indivisis aut vix basi grossius tridentatis" (DC. loc. cit.).[3] *Verbesina tripartita* (L.) Rupr. is a direct synonym for *B. tripartita* L.[4] *Pseudohepatorium foemina* Dodon. ex Rupr. is admitted here with some reluctance as it is really a pre-Linnean name (Rembert. Dodonaeus Mechl. Stirp. Hist. Comm. Imag. 67 and *pl.* 1553), though published in binomial form by Ruprecht. So, also, for *Verbena supina* Trag. ex Rupr. (which goes back to Tragus, De Stirp. Germ., etc., 211. 1552).

B. tripartita var. *latifolia* Rouy was a name applied to small plants collected by P. and E. Carlstrom (*Reliq. Mailleanae* 1267). Excellent specimens examined by me (Burn., D.U.Prag., etc.) are merely small forms (12–30 cm. high) of *B. tripartita*.

B. tripartita var. *indivisa* Corb. ("Feuilles lancéolées, indivises. —Çà et là"—Normandy, France) fits, from its description, a specimen by Mr. Aucher Eloy, No. 3847, northern Persia, 1837, sub nom. *B. cernua* (Del.). This specimen had been labeled "*B. tripartita* δ. *indivisa* DC." by DeCandolle many years before Corbière's name was published.

A number of herbarium names have been included among the synonyms, with the thought that some of these may perhaps have been published in literature not examined by me. *Bidens effusa*

[1] Among Tausch's plants preserved at Leipsic is a specimen of *B. cannabina* Tausch, with the data, "fl. inundat. Bohemiae Tausch!" It is in fine condition and is normal *B. tripartita* L.

[2] For other references to this form, cf. J. E. Smith, Eng. Fl. ed. 1. 3: 399. 1825; ibid. ed. 2. 3: 400. 1828–1830; Mössler, Handb. Gewächsk. (Fl. Deutschl.) 2: 1503. 1833; Steinworth, Phan. Fl. Fürst. Lüneb. 106. 1849; Garcke, Fl. N. M. Deutschl. ed. 2. 174. 1851; Koch, Syn. Fl. Germ. Helv. 309. 1857; Benth. Fl. Austr. 3: 543. 1866; O. Kuntze, Tasch. Fl. Leipz. 137. 1867; Kirschleger, Fl. Vog. Rhén. 364. 1870; Seubert, Excurs. Süddeutschl. 170. 1878.

[3] DeCandolle's type sheet of var. *tenuis* is in the Prodromus Herbarium (Del.). It has Turczaninow's original specimen, also two others. All three are merely small, dwarfed forms of *B. tripartita* L.

[4] Ruprecht (loc. cit.) gives an extended review of the history of *Bidens* as a genus. He rejects the name *Bidens* and adopts, for such species as *B. tripartita* L. and *B. cernua* L., the generic name *Verbesina*.

(leg. *J. L. Thuillier*, Etang de St. Hubert, France, August; Del.) is merely a bushy state. *Bidens tripartita* var. *glareosa* Schz. Bip. (Par.) is a rather small plant of *B. tripartita*. *Bidens tripartita* var. *β. ramosissima* Schz. Bip. was a name applied to a plant by Th. Kotschy (*Pl. alepp. kurd. moss.* 457); a few leaves are tripartite on the specimens examined (Mus. V., 3 sheets; Berl.), the rest are simple. *Bidens tripartita* var. *ruderalis eutripartita* Schur was the name applied to *Schur* 2001 pro parte, in ruderatis, Vienna, Austria, August, 1867 (Kew). Elsewhere (U.S.), the name *Bidens tripartita α. eutripartita* Schur was applied to *Schur* 2001*a*, Brünn, Moravia, July, 1870. *Bidens tripartita* var. *heterophylla* Schur was applied (Par.) to *Schur* 11225*B*, September 24, 1874. Another specimen (Gray) by *Schur*, from near Brünn, Moravia, was labeled *B. tripartita* var. *simplex*.

Bidens tripartita var. *β.* **cernuaefolia** Sherff, Bot. Gaz. 88: 288. 1929. Pl. LXVII, fig. *c*.

Folia indivisa vel summa subtripartita, breviter petiolata petiolis alatis circ. 1 cm. longis, petiolo adjecto 7–9 cm. longa, oblongo-lanceolata, membranacea, glabra, leviter serrulata, apice acuta sed parce acuminata, basi sensim rotundata. Achaenia cuneato-oblanceolata, plana, purpurascenti-atra, faciebus glabra striataque, marginibus retrorsum hamosa, corpore 7–8 mm. longa et 1.5–2 mm. lata, apice biaristata aristis retrorsum hamosis 3–4 mm. longis.

Type specimen: Collected by *R. C. Ching*, No. 4672, rare along open ditch, at altitude of 120 meters, Pei Chen, Province of Anhwei (Ngan-hui; Nganhwei), China, September 15, 1925 (Calif.).

Distribution: Known for a certainty only from type locality of Pei Chen, Province of Anhwei, China; but perhaps occurring also in Formosa (*B. Shimadei* Hay., vide infra).

Specimens examined: *R. C. Ching* 4672 (type, Calif.).

Among the probably more than two thousand sheets of *Bidens tripartita* material studied, all specimens heretofore examined have proved referable either to the species proper or to one of the following three varieties. This plant, from the little known Province of Anhwei, appears to represent a variety quite distinct. The leaves bear a strong resemblance to those found in some forms of *Bidens cernua* L. and of *B. laevis* (L.) B.S.P.

B. Shimadai Hay. (cf. Bot. Gaz. 85: 15. 1928) is construed, from its description and the figure given, to be a simple-leaved form of *B. tripartita*, probably best referred to the var. *cernuaefolia*. Hayata

(loc. cit.) applied this name to a plant collected by Y. Shimada at Schichiseizan, Formosa, September, 1916. He described the plant as being near to *B. tripartita*, but stated that it differed "in the simple, not lobed, leaves."[1]

Bidens tripartita var. γ. **repens** (D. Don) Sherff, Bot. Gaz. 81: 45. 1926. Pl. LXVIII, figs. *a–f*.

Bidens repens D. Don, Prodr. Fl. Nepal. 180. 1825.

Bidens trifida Buch. in Roxb. Fl. Ind. ed. 2. 3: 411. 1832.

Bidens Taquetii Lévl. & Vant. ex Lévl. Bull. Acad. Internat. Geogr. Bot. 20: 3. 1910.

Bidens minuscula Lévl. & Vant. ex Lévl. loc. cit.

Saepius tantum 1–4 dm. alta, foliis nunc simplicibus et anguste lanceolatis, nunc tripartitis segmentis anguste lanceolatis vel saepe cuneato-lanceolatis. Achaenia cuneato-linearia, brunneo-subnitida vel subnigra, marginibus levia vel debiliter retrorso-hamosa, corpore plerumque 5–8 mm. longa, apice 2- vel 3-aristata aristis retrorsum hamosis.

Type specimen: Collected in State of Nepal, British East India. Don's book was based primarily upon plants collected in the years 1802–1803 in Nepal by *Dr. Hamilton*, but was supplemented by plants sent in more recently by *D. Wallich*.[2] It is evident from Don's text, and considering all available herbarium data, that his *Bidens repens* was based upon (1) "*Bidens frondosa* Linn.? Hamilton Mss.;" (2) "*B. tripartita* Roxb. Hort. Beng. p. 60;" (3) the specimens sent in by Wallich. The Hooker Herbarium (Kew) has one specimen (omitted from the list below) that is probably the Roxburgh plant seen by Don and that might be regarded as the type or its equivalent. In any case, the Wallich plants (vide "Specimens examined") all exactly match each other and also Don's description and are equally representative of his concept.

Distribution: From Island of Quelpaert (Corea) and Province of Chi-li (China) to Province of Yun-nan (China), to northern and eastern British East India, southward to Island of Luzon (Philippine Isls.), Java, and Dutch New Guinea.

[1] It may be remarked in passing, that normal *B. tripartita* grows in Formosa. Hayata lists a normal specimen of *B. tripartita* collected in the type locality for his *B. Shimadai: T. Soma*, Schichiseizan, March, 1916.

[2] Thus we read, on Don's title page, ". . . sive Enum. vegetabilium, quae in itinere per Nepaliam proprie dictam et regiones conterminas, ann. 1802–1803. Detexit atque legit D. D. Franciscus Hamilton, (olim Buchanan) M.D. . . . Accedunt plantae à D. Wallich nuperius missae. . . . David Don. . . . 1825."

Specimens examined: *C. A. Backer* 12506, alt. 1,700 meters, near pool, Tclaga Pattenggang, Preanger Regencies, Java, March 24, 1914 (Buit.; achaeniis tenuissimis sed ad corporum margines retrorsum hispidis; Calif.); *Bretschneider*, Peking, Prov. Chi-li, China (Berl.); *C. B. Clarke* 23674, alt. 900 meters, Raipur, British East India, October 15, 1874 (Kew); *idem* 41686*A*, alt. 1,425 meters, Kohima (Koluma), Naga Hills Distr., British East India, October 22, 1885 (Kew); *idem* 41825*A*, alt. 1,650 meters, Chekwema (Kegwima), Naga Hills Distr., British East India, November 9, 1885 (Kew); *Henry Collett*, alt. 1,500 meters, Kulu Valley, British East India, October 17 (Kew); *M. P. Edgeworth*, alt. 1,500–2,400 meters, Himalaya region, British East India, 1844 (Kew; forma e specie ipsa non valde differens); *E. E. Maire*, ditches at alt. 2,500 meters, plain of Tung-chuan (Tong-tchouan), Prov. Yun-nan, China, September, 1910 (Mus. V.); *idem*, ditches, pools, eodem loco, September, 1912 (Del.); *R. Oldham* 411 pro parte, Nagasaki, Japan, 1862 (N.Y.); *Máximo Ramos* 5537, Río Trinidad, Benguet Prov., Luzon, Philippine Isls., December, 1908 (U.S.); *R. R. Stewart* 10056, Gund, Kashmir, Sind Valley, northwestern Himalaya, September 1, 1928 (N.Y.); *R. Strachey & J. E. Winterbottom* 3, alt. 1,200 meters, below Almora, Kumaon, Himalaya region, British East India (Gray; Kew); *Makoto Takenouchi*, alt. about 1,300 meters, wet meadow on Mt. Hizengajhô, Kudzu Mountain Range, Prov. Bungo, Kyushu Isl., Japan, August 29, 1924 (Field; plantis pumilis typo *B. minusculae* Lévl. & Vant. ex Lévl. valde similibus); *Taquet* 1031, alt. 1,000 meters, wet, herb-grown places, Hallaisan, Quelpaert Isl., Corea, September 18, 1908 (cotypes *Bidens minuscula* Lévl. & Vant. ex Lévl.; Berl.; Del.; Kew; Mun.); *idem* 1035, alt. 900 meters, forests, Hioton, Quelpaert Isl., Corea, September 18, 1908 (cotypes *Bidens Taquetii* Lévl. & Vant. ex Lévl.; Berl.; Kew); *T. Thomson*, alt. 1,500–1,800 meters, Kumaon, Himalaya region, British East India (Kew); *idem*, alt. 1,500–1,800 meters, British East India (temperate region), October, 1848 (Kew, 2 sheets); *idem* 1238, eodem loco, June, 1845 (Kew; Oxf.); *Versteeg* 1192, Dutch New Guinea, August 3, 1907 (Berl.; Kew; achaeniorum corporibus margine paucihamosis); *idem* 1543, eodem loco, July 31, 1907 (Berl.; Kew; a Versteegii numero 1192 non differt); *Wallich* (cat. 3187, comp. 297*a*), Nepal, British East India, 1821 (Berl.; Brit.; Del., sub inscript. "297. *Bidens tripartita* Rogb. herb. 1824. *A Nepalia.* Comp. angl. des Ind. 1830"); *Warburg* 3142, Java, September, 1866 (Berl.).

Bidens Taquetii Lévl. & Vant. and *B. minuscula* Lévl. & Vant. were described from specimens collected by Taquet in Corea. *B. Taquetii* (*Taquet* 1035) is described as having heads radiate, ligules 3-striate. The several cotypes examined (Berl.; Kew) uniformly lack rays, but even were tiny rays present they alone could not be of conclusive value in diagnosis, since true European *B. tripartita* (vide supra) has been known for many years to produce, in rare cases, small rays. *B. minuscula* (*Taquet* 1031) is merely a dwarfed form of *B. Taquetii*. Its several cotypes studied (Berl.; Del.; Kew; Mun.) excel, however, in having mature achenes. These have the slender, cuneate-linear, often almost glossy bodies with smooth margins, observed in a number of specimens from the Orient. Quite generally in herbaria this far-eastern form has been referred to *B. tripartita*. The dwarfed plants of it, however, do not resemble the dwarfed plants of *B. tripartita* commonly found, for example, in Europe. Rather do they have slender, oblanceolate leaves. Among the larger plants, various intergradations in foliage are found, particularly in Japan and Formosa, between the form of the Orient and the one typical in Europe. We have also the fact that in the particular oriental form under discussion the smooth margins of the achenes are strikingly different from the spinulose margins of normal *B. tripartita* achenes. In view of these considerations, it seems wisest to treat the Taquet plants as representing a geographic variety.

Reference to literature shows that long ago this eastern variety was listed for Nepalia (India) by Roxburgh, who published the manuscript name *Bidens trifida* previously given it by Buchanan, and gave a full description. Roxburgh's description of the achenes ("flat, wedge-shaped, smooth, without angles; horns two, rarely three, backwardly hispid, diverging") is significant.

In the British Museum of Natural History are two old sheets, labeled in pencil, "*B. repens* Don." The plants are similar to the cotypes of *B. Taquetii* Lévl. & Vant., and match the description of *B. trifida* Buch. ex Roxb. They match also Don's earlier but less ample description, published in 1825, of *B. repens*. At least one plant was collected by Wallich, likewise in Nepalia, and bears Wallich's list No. 3187*a*. Don's text included plants "a D. Wallich nuperius missae," and it is probable that he had seen these sheets before publishing his description of *B. repens*. In any case, his description rested primarily, as did Roxburgh's, upon the material collected by Buchanan[1] in Nepal, and thus, with *B. repens* Don,

[1] Known in literature also as Francis Hamilton (cf. Don, loc. cit.; Alph. DC. Phytogr. 418. 1880).

B. trifida Buch. ex Roxb. is seen to be synonymous.[1] (Additional data are given above under "Specimens examined.")

Bidens tripartita var. δ. **orientalis** (Velen.) Sherff, Bot. Gaz. 81: 47. 1926. Pl. LXIX, figs. *h–n*.

Bidens orientalis Velen. ex Bornm. Bot. Centralbl. 36: 61. 1888 (nomen); Velen. Sitzb. Boehm. Ges. Wiss. 1888: 49. 1889. (Cf. etiam Fl. Bulg. 250. 1891.)

Bidens orientatis Velen. Sitzb. Boehm. Ges. Wiss. 1888: 48. 1889 (sphalm).

Var. achaeniis parvis, obovato-cuneatis, planis, nitidis, purpureo-nigris vel saepius nigrescentibus, ad margines retrorsum tuberculato-hamosis, alibi glabris vel apicem versus sparsissime pilosiusculis, corpore exterioribus 4–4.5 mm. longis et 2.2–2.5 mm. latis interioribus circ. 4.5 mm. longis et 1.5–2 mm. latis, omnibus biaristatis vel saepe imperfecte triaristatis, aristis retrorsum hamosis, duabus principalibus circ. 2 mm. longis.

Type specimen: Collected by *Velenovsky*, No. 1888, on the shores of the Kamtchik (Kamcyk) River, Bulgaria (non visum).

Distribution: Spain, Jugo-Slavia, and eastern European Russia (Kazan) southeastward to Montenegro and European and Asiatic Turkey.

Specimens examined: *Lujo Adamovic*, wet places, Vranja, Serbia, September 2, 1903 (Berl.); *idem*, marshes, Adrianople, Vilayet of Adrianople, European Turkey, July, 1906 (Berl., 2 sheets; Del.; Kew; Mus. V.; U.V.); *Joseph Bornmüller* 9, swamps, Kebedze, Varna, Bulgaria, September 21, 1889 (Boiss.; Brit.; Kew; Phila.; U.V.); *idem* 1177 (Berl.); *Charreli* 692, alt. 250 meters, Acropolis of Seres, Vilayet of Saloniki, European Turkey, August 21, 1888 (Berl.); *Friedrichsthal* 1088 (1688?), lake near Saloniki, Vilayet of Saloniki, European Turkey (Mus. V.); *S. Korzchinsky*, Raifa, Distr. Kazan, Government of Kazan, Russia, 1884 (Berl.); *D. I. Litwinow* 38, edges of water, near Ashabad, Turcomania, November 15, 1897 (Berl.; Del.); *F. S. Meyers & J. E. Dinsmore* 1904, wet places, shore of Lake Huleh, Palestine, September 2, 1921 (Del., 2 sheets); *Prodan*, marshy places near Bezdan, Jugo-Slavia, September, 1914

[1] Mention may be made also of *Vladimir L. Komarov* 1535 p.p., collected along the Mu-dan-dsian River, Province of Kirin, Manchuria, Sept. 19, 1896 (Berl.; Brit., etc.). This is a small, slender mud form with elliptic or oblong-lanceolate leaves, and achenes moderately retrorse-hooked on margins. It was distributed under the name *B. tripartita* var. *limosa* Komarov. The plant is an intermediate form between var. *repens* and the species proper (cf. p. 274).

(Transsilv.); *Jos. Rohlena*, Bar, Montenegro, August, 1910 (Berl.); *C. K. Schneider* 1018, sandy places near Studena, near Nisch, Serbia, September 5, 1907 (Berl.; Kew; Mo., 2 sheets; Mus. V.; Phila.); *Bros. Sennen & Septimin* 178 p.p., ditches, Fortiá to Fortianell, Catalonia, Spain, October, 1906 (Cluj; Mus. V.); *Sintenis Bros.*, Pristav, Dobrudja Division, Roumania, September 18, 1872 (Berl.); *iidem* 419, Babadag, Dobrudja Division, Roumania, September 12, 1873 (Kew); *P. Sintenis* 1119 ("Bunarbaschi: Kirk Goez"), Asiatic Turkey, September 12, 1883 (Berl.; Brit.; Coss.; Kew; U.V.); *Venceslaus Stribrny*, swamps at Sadovo (near Philippopolis), Bulgaria, May 28, 1893 (Bucht.; Cluj; Del.; Mus. V., 2 sheets); *idem*, near waters at Sadovo, Bulgaria, August, 1893 (Berl.; Del.; Mus. V.; U.V.); *idem*, eodem loco, August, 1894 (Berl., 2 sheets; Kew); *idem*, swamp meadows, eodem loco, September 3, 1893 (Boiss.); *idem*, marshy places, eodem loco, September 15, 1896 (U.V., 3 sheets); *idem*, swamp meadows, eodem loco, September 27, 1896 (Del., 2 sheets); *idem*, marshy places, eodem loco, September 10, 1898 (Del., 2 sheets); *idem*, marshy places, eodem loco, October, 1906 (Cluj); *Urumoff* 52, Bulgaria, 1895 (U.V.); *Welwitsch* 243, Tagus River region, Lusitania, 1848 (Del.).

The most distinctive feature of the several specimens examined from the type region is the small, often black achenes. Numerous intergradations between these and typical *B. tripartita* achenes are found in European material, however, and in no other characters can I find sufficient constancy to warrant specific segregation from *B. tripartita* L. Evidently it is more logical to rank these small-fruited extremes, especially common in Bulgaria and Serbia, as a variety of *B. tripartita* L.

Bidens tripartita var. ε. **hirta** (Jord.) Sherff, Bot. Gaz. 81: 47. 1926. Pl. LXX.

Bidens bullata L. Sp. Pl. 833. 1753; Harduin, Animadv. Bot. *pl. 18*. 1764.

Bidens hirta Jord. in Gren. & Godr. Fl. Fr. 2: 168. 1850; cf. Boullu, Bull. Soc. Dauph. 1880: 423. 1880.

Bidens tripartita sub-var. *rugosa* Coss. & Germ. Fl. Par. ed. 2: 487. 1861.

Bidens tripartita var. *hispida* Car. & St. Lag. Fl. Bass. Moy. Rhône 459. 1889.

Bidens bullata var. *hirta* (Jord.) Coste, Fl. Fr. 2: 357. 1903; cf. Fiori in Fiori & Paoletti, Fl. Anal. Ital. 3: 302. 1904.

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Bidens fastigiata var. *hispida* Jord. ex Car. & St. Lag. Et. Fl. 459, fide Rouy, Fl. Fr. 8: 219. 1903.

Bidens tripartita var. *genuina* sub-var. *rugosa* Coss. & Germ. in Rouy, op. cit. 218.

Bidens tripartita subsp. *bullata* (L.) Rouy and subsp. *bullata* var. *hirta* (Jord.) Rouy, op. cit. 219.

Bidens bullata vars. *typica* and *glabrescens* Fiori, loc. cit.

Bidens bullata var. *eu-bullata* Briq. & Cavill. Fl. Alp. Marit. 6: 218. 1917.

Bidens tripartita subsp. *bullata* var. *glabrescens* (Fiori in Fiori & Paol.) Briq. & Cavill. op. cit. 219 and 327.

Bidens tripartita subsp. *bullata* var. *hispida* Car. & St. Lag. ex Briq. & Cavill. Fl. Alp. Marit. 6: 218 and 327.

Caulis erectus. Folia principalia plerumque indivisa, subovata, dentata, saepius crassa, plerumque setosa et saepe plus minusve bullata, basi abrupte breviterque petiolata petiolo alato; superiora saepe ternata, subsessilia, foliolis lateralibus et saepius minimis.

Type specimen: No particular specimen was cited as the type. The authors (Grenier and Godron) evidently had a number of *Jordan's* specimens in mind along with certain other materials.[1]

Distribution: Southern Italy near Naples; northern Italy, where common from provinces of Padua and Florence westward to provinces of Turin and Cuneo; in southeastern France (departments of Isère, Rhône, etc.) and very rare northwestward to Paris.

Specimens examined: *Anon.*, ditches, Padua and Pavia, Italy, August–September (Mus. V.); *anon.*, Pontchéri to Lyon, France, September 3, 1836 (Mus. V.); *C. Billot*, Lyon to Pontchéri, France (Berl.); *idem*, La Verpillière near Lyon, France (Coss.); *A. Boullu*, Charvieux, Isère, France, September, 1851 (U.V.); *idem*, Pontchéri, Isère, France, August, 1853 (Kew); *idem*, Pontchéri, Charvieux, Isère, France, September 15–October 9, 1883 (Boiss., sub nom. *B. hirto-tripartita* Boullu); *idem*, Rochelaise, Isère, France, 1883 (sub nom. *B. hirto-tripartita*); *idem* 310, Ile de Rubens, Pontchéri, Dept. Isère, France, September 6–October 14, 1882 (Coss.; Del.; Mus. V.; U.V.); *idem* 798, along the Bourbre at Charvieux, Isère, France, September, 1851 (Coss.); *idem* 3769, cool, wet places, Pontchéri, Isère, France, September 6–October 14, 1882 (Boiss.; Coss.);

[1] They prefaced (loc. cit.) their descriptive paragraph with: "**B. hirta** *Jord. ined.; B. bullata Balbis! fl. lyon.* I, *p.* 376 (*non L.*). *Schultz, exsicc.* 664!" They closed with: "*Hab.* Lyon, à la Tête-d'Or, à Pontchéri," etc.

ex herb. *A. Braun*, ditches, etc., Padua, Italy (Berl., 3 sheets); *Cesats (& Camel)* 156, near Villa-franca and along streams at Monteserrato, near Verona, Italy, September (Coss.; U.S.); *Cesats (Cisati, Cesati)*, Villa-franca, Italy, October, 1859 (Berl.); *E. Ferrari & Vignolo-Lutati*, Prov. Cuneo, Italy, August 31, 1912 (Field); *Adr. Fiori & A. Béguinot* 1376, alt. 13 meters, sandy clay soil, Padule di Fucecchio, Etruria, Prov. Florence (Firenze), Italy, September 20, 1909 (Kew; U.V.); *Michel Gandoger*, moist places near Naples, Italy, August, 1871 (Kew); *idem* 88, marshes near La Verpillière, Dept. Isère, France, July 28, 1872 (Field); *idem* 88[*b*], La Verpillière, Isère, France, July, 1874 (Mo.); *idem* 1410, Turin, Italy, 1871 (Mo.); *Grenier*, Lyon, France, 1846–1852 (Kew); *Alexis Jordan*, Lyon, France (Kew); *idem*, Pontchéri, Lyon, France (Mus. V., 4 sheets); *idem*, (à la tête d'or) Lyon, France, 1849 (Berl.); *idem*, marshes, edge of Rhône River, Lyon, France (Del.); *idem*, La Verpillière, Dept. Isère, France, September, 1841 (Cop.); *idem* 664, marshes at edge of the Bourbe at Pontchéri, Dept. Isère, France, September 12, 1842 (Coss.; Del., 2 sheets; Kew; Mus. V.); *C. Martin*, moist places at La Verpillière, Isère, France, September, 1851 (Coss.; Mus. V.); *Antonio Mori*, near Castelfranca dell' Emilia, Italy, September 11, 1884 (Mus. V.); *idem*, Bologna, Italy, October, 1887 (Berl.); *idem*, wet places, near Bologna, October, 1888 (U.V.); *idem*, ditches, vicinity of Villa Colombaro, Prov. Modena, Italy, September, 1892 (Berl.; Mus. V.); *idem*, eodem loco, September, 1893 (Cop.; Del.); *idem*, eodem loco, September, 1894 (Berl.); *idem*, eodem loco, September, 1896 (Mus. V.); *F. Negri* 2103, moist places, Casale Monferrato, Italy, September, 1878 (Boiss.; Coss.; Kew); *Romualdo Pirotta*, Valle la Veniera, near Reggiolo, Prov. Reggio Emilia, Italy (Flor., forma plus minusve glabra); *Taponnier*, vicinity of Lyon, France, September (Berl.; Mus. V.); *anon.* (leg. *Weddell?*), islands of Seine River, Paris (Charenton), France, 1841 (Par., ex herb. Wedd. et sub nom. *Bidens tripartita* L. var. *β. rugosa*).

Linnaeus presented a rather distinctive description of his *Bidens bullata*, but gave its habitat as America. The single well-preserved specimen in the Linnean Herbarium matches the original description very closely. There can be no doubt that Linnaeus drew his description either from this specimen or from another identical with it. However, the plant is seen at once to be a European form, entirely unknown from America or any other continent than Europe. The plate of *B. bullata* published by Harduin (Animadv. Bot. *pl. 18.* 1764) differs in no important respect except that the principal

leaves are undivided, instead of being tripartite with the lateral lobes small and inconspicuous, as in Linnaeus' specimen. The various herbarium specimens distributed by Jordan from the vicinity of Lyon, under his name *B. hirta*, have the leaves undivided, but certainly cannot be said to differ consequentially from Linnaeus' plant. In fact, other specimens have been collected in the same locality that have the leaves tripartite, just as in the Linnaean plant (e.g., *Boullu* 310). The variation in the amount of roughness is likewise considerable. In view of this variation in leaf division and in amount of roughness, there can be no question that the plants of Linnaeus and of Jordan are specifically identical.

Furthermore, these plants are connected by many apparently freakish specimens[1] with *B. tripartita*, and doubtless are to be regarded more accurately as a rather well-marked foliage form of that species. Rouy (loc. cit.) appears to have come to a similar conclusion, but his adoption of subspecific rank for *B. bullata*, and his making *B. hirta* a variety of the subspecies are too unconventional to secure wide acceptance, nor do they seem other than mere attempts to maintain distinctions for which no real basis exists. It happens, however, that Coste (loc. cit.) definitely published the name *hirta* as a variety, although under the species *B. bullata* (!).[2] In this curious way the name *hirta* was the first to receive publication with varietal rank, and, under the International Rules, must be adopted instead of *bullata*.

It may be noted that the Abbé Boullu, whose collections of this variety extended over more than thirty years, paid particular attention to the matter of variation in its leaves. Finding various forms intermediate between *B. hirta* Jord. and *B. tripartita* L., and having assumed that *B. hirta* as well as *B. tripartita* was a valid species, he suspected the intermediate forms of being hybrids.[3] In the genus *Bidens* hybridity is so rarely encountered that, in the absence of more positive evidence, the intermediate forms would seem best accounted for on the basis of ordinary variation. Boullu

[1] Especially branches from more or less injured stems.

[2] The manifest unwillingness of so many writers to equate the names *hirta* and *bullata* as synonyms surely must have been because Linnaeus erroneously cited America as the home of *bullata*, and, further, because they had never seen the Linnean Herbarium specimen. Had they seen this plant, they would have been quick to realize that it was the form found in Europe and nowhere else.

[3] "Dans la Flore de France de Gr. et God. il est dit des feuilles de cette espèce ovales, fortement dentées, ce qui semble exclure toute idée de division; or parmi les exemplaires qu j'ai récoltés près de la Bourbre à Pont-de Chérui, bon nombre portent quelques feuilles bi ou tripartites tantôt dans le haut, tantôt dans la bas de la plante. J'ai trouvé là le *Bidens hirta* comme perdu dans une fôret de *B.*

described (Bull. Soc. Bot. Lyon, ser. 2. 7: 6 and 109. 1889) two of these supposedly hybrid forms under the names *B. hirto-tripartita* Boullu (with leaves broad, often tripartite) and *B. tripartito-hirta* Boullu (with leaves narrow, but likewise often tripartite). For the first of these two names, Rouy (Fl. Fr. 8: 219. 1903) has proposed the name, ×*B. Boullui* var. *subbullata;* for the second, ×*B. Boullui* var. *subtripartita.*

Cosson and Germain's *B. tripartita* sub-var. *rugosa,* a plant found about Paris, is seen from its description[1] to belong to this variety. I find no authentic specimen in the large Cosson Herbarium at Paris (Par.), but the main herbarium at Paris (Par.) has a specimen from the environs of Paris (Charenton, on the islands of the Seine River, collected in 1841) given by Weddell in 1848 and clearly the source of Cosson and Germain's sub-variety. It is a remarkably hispid-scabrous form. In fact, its extreme roughness had been noted by Weddell, for his label reads, "*Bidens tripartita* L. var. β. *rugosa.*" Evidently the name sub-var. *rugosa* was later derived from this. Cosson & Germain's comment, "Assez commun," is doubtless inaccurate, for such extremely rough forms appear rare in the vicinity of Paris.

B. bullata var. *glabrescens* Fiori is seen upon examination of the original materials (Flor.) to be merely a rather glabrous form of var. *hirta.*

EXPLANATION OF PLATE LXVII

Bidens tripartita, figs. *a, b, d–i*: *a* (normal) and *b* (dwarf) flowering and fruiting specimens, ×0.67; *d,* exterior involucral bract, ×4.02; *e,* interior involucral bract, ×4.02; *f,* palea, ×4.02; *g,* disc floret, ×4.02; *h* (outer), *i* (inner), achenes, ×4.02; *a,* chiefly from main specimen of *Bidens tripartita* in Hb. Linn., but slightly from *Caspary,* hb. No. 331811 in Hb. Field; *b,* from *hb. Fl. Ingricae* 308 (hb. No. 11839), in Hb. Field; *d–i,* from *Caspary* (as in *a*).

Bidens tripartita var. *cernuaefolia,* fig. *c*: cauline leaf, ×0.67; from type.

EXPLANATION OF PLATE LXVIII, FIGS. *a–f*

Bidens tripartita var. *repens: a,* entire flowering plant, ×0.68; *b,* exterior involucral bract, ×3.4; *c,* interior involucral bract, ×3.4; *d,*

tripartita L., atteignant près de deux mètres de hauteur. Les sujets à feuilles divisées seraient-ils un produit hybride de ces deux espèces? Sur les pieds isolés que j'ai rencontrés en plusieurs autres lieux, je n'ai pas observé cette division des feuilles." (From a printed clipping attached to sheet in Herb. Boiss.)

[1] "Tiges et rameaux rugueux-scabres, parsemés d'aiguillons sétiformes courts. Feuilles ord. rudes-scabres."

BIDENS HYPERBOREA Greene (figs. *b*, *d*, *f*, *h*, *j*, *l*);
var. GASPENSIS Fern. (figs. *a*, *c*, *e*, *g*, *i*, *k*, *m*)

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palea, ×3.4; *e*, disc floret (4-lobed) with submature achene having aristae barbed chiefly on inner side, ×4.08; *f*, achene, ×4.08; *a–e*, from *Taquet* 1035 (cotype of *Bidens Taquetii* Lévl. & Vant.), in Hb. Kew; *f*, from *Taquet* 1031 (cotype of *Bidens minuscula* Lévl. & Vant.), in Hb. Kew.

EXPLANATION OF PLATE LXIX, FIGS. *h–n*

Bidens tripartita var. *orientalis: h*, entire flowering and fruiting plant, ×0.63; *i*, exterior involucral bract, ×3.77; *j*, interior involucral bract, ×3.77; *k*, palea, ×3.77; *l*, disc floret, ×3.77; *m* (biaristate), *n* (triaristate), achenes, ×3.77; all from *Bornmüller* 9, in Hb. Kew.

EXPLANATION OF PLATE LXX

Bidens tripartita var. *hirta: a*, flowering and fruiting specimen, ×0.68; *b*, exterior involucral bract, ×2.04; *c*, interior involucral bract, ×2.04; *d*, palea, ×2.04; *e*, disc floret with submature achene, ×2.04; all from *Jordan*, Lyon, France, in Hb. Kew.

90. **Bidens radiata** Thuill. Fl. Par. ed. 2: 422. 1799; cf. Oerst. in Vid. Medd. 1862: 312–319, *pls. 3, 4, figs. 1–17*. 1863.
Pl. LXIX, figs. *a–g*.

Bidens tripartita var. γ. Lam. & DC. Fl. Franc. ed. 3. 4: 219. 1805.

Bidens foliosa Willd. Enum. Hort. Berol. Suppl. 56. 1813 (nomen subnudum); J. C. Loudon, Hort. Brit. 335. 1830; cf. Sherff, Bot. Gaz. 86: 446. 1928.

Bidens tripartita var. *C*, F. V. Mérat, Nouv. Fl. Env. Paris, ed. 4. 2: 370. 1836.

Bidens tripartita var. β. *pinnatifida* Turcz. ex DC. Prodr. 5: 594. 1836.

Bidens fastigiata Michalet, Mém. Soc. Emul. Doubs, ser. 2. 5: 29. 1854.

Bidens platycephala Oerst. Ind. Sem. Haun. 27. 1859; Linnaea 30: 753. 1859–1860; Vid. Medd. 1862: 312–319, *pls. 3, 4, figs. 1–17*. 1863.

Bidens intermedia Opiz ex Nyman, Consp. Fl. Europ. 348. 1879.

Bidens polycephala Oerst. ex E. Fiek, Fl. Schlesien 218. 1881.

Bidens tripartita f. *pinnatifida* (Turcz. ex DC.) Beck v. M. Fl. Nied. Ost. 2, pt. 2: 1191. 1893.

Bidens tripartita var. α. *genuina* subvar. *pinnatifida* (Turcz. ex DC.) Rouy, Fl. Fr. 8: 218. 1903.

Bidens radiata f. *perpusilla* Dom. Sitzungsb. Vgl. Böhm. Ges. Wiss. 19: 34. 1905.

Erecta, stricta, annua, glabriuscula, fastigiate ramosa, 3–7 (raro –20) dm. alta, caule ramisque stramineis vel rariter purpurascentibus. Folia petiolata petiolis 1–3 cm. longis, petiolo adjecto 6–13 cm. longa, membranacea, subflavido-viridia (in speciminibus depauperatis simplicia sed) plerumque pinnatim tri- vel quinquepartita; foliolis lanceolatis vel lineari-lanceolatis, serratis, plus minusve ciliatis. Capitula ad ramorum apicem 2–4-adgregata, plerumque breviter pedunculata pedunculis 0.5–3 cm. longis, discoidea,[1] demum flavido-straminea, facie superiore valde convexa, inferiore concava, disco demum circ. 1.5 cm. lato ac 6–7 mm. alto; floribus tubulosis numerosis, plerumque 100–240. Involucrum basi sparsim hispidulum; bracteis exterioribus 7–14, linearibus, sparsim denticulato-ciliatis, foliaceis, 6–20 mm. longis, interiores lanceolatas superantibus. Achaenia cuneata, grisea vel griseo-nigra, plana, dorso non costata, altera facie costa mediana inconspicue costata, marginibus retrorsum hamosa, alibi (faciebus) glaberrima, corpore 3–3.5 mm. longa, biaristata; aristis stramineis, retrorsum hamosis, 1.6–2.2 mm. longis.

Type specimen: No particular specimen cited by Thuillier. He stated the species to occur at Chaville, at the pond at the Rendez-Vous de Chasse and at the pond at St. Hubert, France (authentic specimens by *Thuillier*, Del. and Par.).

Distribution: Sweden and Finland, northward to the end of the Gulf of Bothnia (circ. 66° N. Lat.); in northwestern and southwestern European Russia; in western Europe southward to the departments of Loir-et-Cher and Jura in France, to Bavaria and to Lower Austria; also widely distributed in northeastern Asia from the Altai and Ircut (Irkutsk) region eastward to Kamchatka Peninsula, Sakhalin Island and the Province of Kirin (in Manchuria); adventive in vicinity of Oxford, England, in 1874 (*Garnsey* 756). Frequently hybridizes with *Bidens tripartita* L.

Specimens examined: *Anon.* (type material of *Bidens foliosa* Willd.; Berl.; Mus. V.; Willd., sub num. 15020–5); *C. Baenitz*, Löwenhagen, East Prussia, September–October, 1878 (Berl., 3 sheets; Field; Mus. V.); *idem*, in dried-up pond near Löwenhagen, East Prussia, August 20, 1889 (Berl.; Field); *Hugo Bohnhof* 186, Vladivostok and Lake Khanka (Lake Kanka; L. Hanka) region of northeastern Asia, 1898–1899 (Berl.; Boiss.; Del.; Field; Kew; Par., 2 sheets); *Ed. Bonnet & Th. Delacour* 311, dried-up banks of the pond of Saint-Quentin near Trappes, Dept. Seine-et-Oise, France, Sep-

[1] Not radiate as implied in the trivial name. Thuillier's own specimens are discoid! (Cf. DC. Prodr. 5: 594. 1836; "discoidea in ipsissimo auct. specim.")

BIDENS DIVERSA Sherff (figs. *a*, *b*, *d*–*i*); var. MEGAGLOSSA Sherff (fig. *c*)

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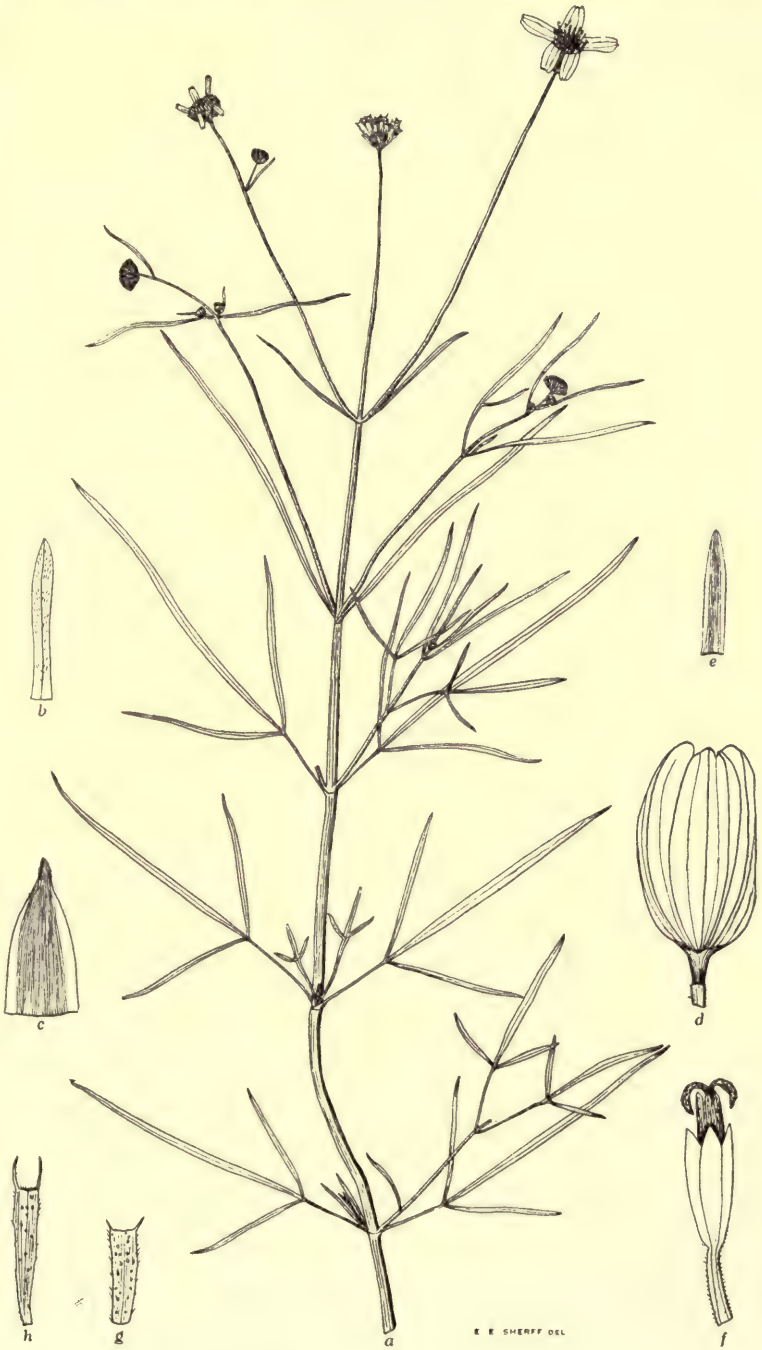
tember 2, 1882 (Berl.; Del.; Mus. V.); *A. Callier*, in flooded places near Reichenbach, Silesia, September 8, 1887 (Cop.); *idem* 47, pond, eodem loco, August, 1887 (Boiss.; U.V.); *Celakovsky*, shore of Beraun River at Radotin, Bohemia, September, 1872 (U.V., 2 sheets); *idem* 3067, along fish ponds near Chudenic, Bohemia (Berl.; Boiss.; Cop.; Del.; Kew; Mo.; Mun.; Mus. V.; U.V.); *Otto Collin*, among *Bidens cernua* and *B. tripartita*, on muddy and flooded banks of ditches along public road, not far from Tavastburg, southern Tavastehus, Finland, August, 1885 (Mus. V.) and August 10, 1897 (U.S.) and August 11, 1897 (Corn.); *idem*, Tavastehus, August 22, 1898 (Cop.); *idem*, on muddy sides of road, north of Tavastehus, southern Tavastehus, Finland, August, 1903 (Gray; N.Y.); *K. F. Dusén*, rare, in swampy places near Ydre, Ostsogothia, Sweden, August, 1870 (Kew); *A. Engler*, vicinity of Reichenbach, Silesia, October 2, 1870 (U.V.); *Urbain Faurie* 734, Korsakofski (Korsakof), Sakhalin (Sagalien, Sachalin), Japan, September, 1908 (Berl.; Brit.); *G. Fischer & K. E. Harz* 826, alt. about 260 meters, in mud, near Müllersdorf on the Aisch River, Bavaria, September 10, 1904 (Del., 2 sheets; Gray; Mun.); *H. A. Fröding*, Ulfsby, Lake Friken, Vermland, Sweden, August 24, 1911 and September 8, 1913 (Cop., sub nom. var. *integra* f. *gracili*); *idem*, eodem loco, September 8, 1914 (Cop., sub nom. *B. radiata* var. *latiloba*); *idem*, eodem loco et tempore (Cop., sub nom. var. *aberrante;* forma plus minusve aberrans, plantis 10–15 cm. altis, *B. tripartitae* adpropinquantibus et forsan cum ea specie hybridis); *H. E. Garnsey* 756, vicinity of Oxford, England, 1874 (U.V.); *E. Gaudefroy* 13, borders of ponds at St. Hubert, 10 km. north-northeast of Rambouillet, Dept. Seine-et-Oise, France, September 8, 1872 (U.V.; hic unus duorum originalium locorum a Thuill. datorum); *O. Gelert*, Kirkevaerlose, Sjaelland (Sjelland, Zealand), Denmark, September 25, 1889 (Berl., 2 sheets); *Kurt Harz*, near Bamberg, Bavaria, September 26, 1908 (Mus. V.); *idem* 5090, alt. 260 meters, in swampy places near Willersdorf, "Bavaria," September, 1904 (Berl.; Cop.; Del., 2 sheets; Mun.; Mus. V.; U.V.); *F. Heidenreich*, at mill pond, Tilsit, East Prussia, August 28, 1871 and September 6, 1876 (U.V.); *idem*, eodem loco, September 5, 1872 and August 26, 1873 (Mus. V.); *idem*, wet banks of Memel (Niemen) River, Tilsit, East Prussia, September 5, 1872 (U.V.); *A. Hülphers*, Karlstad, Vermland, Sweden, August 15–20, 1901 (Cop.; N.Y.); *idem*, Sunne, Vermland, August 16, 1914 (Cop., sub nom. *B. radiata* f. *integra*); *Herb. Florae Ingricae* Cent. VII, 308 pro parte, Government of Petrograd, Russia (Kew; Mus. V., 2 sheets; Cop., verisimiliter cum

B. tripartita commixt.); *idem* Cent. VII, 308*B*, in flooded places, marshes, ditches, margins of wet fields, also among sedges, nearly always fairly abundant, eodem loco, July–September, 1861 (Field; Kew); *Jos. Jahn* (*F. Petrak* Distrib. VI) 573, drained pond near Marienbad, Bohemia, September, 1910 (Del.; Gray); *F. Karo* 397, swamps, ditches, Nerisynsk (Nerchinsk), Transbaikalia, Siberia, 1890 (Berl.; Boiss.; Kew; Mus. V.); *A. O. Kihlman* 385, ditch near Jyväskylä, northern Tavastehus, Finland, August 31, 1899 (Berl.; Cop.; Del., 2 sheets; Kew);[1] *V. L. Komarôv*, Sajan Mts., along headwaters of the Ircut (Irkutsk) and Oká rivers, Government of Ircut (Irkutsk), Siberia, 1902 (Berl.); *idem* 1535 p.p., Prov. Kirin, Manchuria, October 7, 1896 (Berl.); *idem* 3291 p.p., Kamtschatka (Kamchatka) Peninsula, 1909 (Berl.); *Fr. Körnicke*, Isl. Crestofski (Isl. Krestovskoi), Leningrad, Russia, August, 1857 (Berl., 2 sheets); *J. Lange* (*Fries, Herb. Normale, Fasc.* XVI), Hellebaek (Holbaek), Zealand (Sjelland, Seeland), Denmark (Berl.; Boiss.; Kew; Mo.); *Ledebour*, Altai, Siberia, 1831 (Par.); *Harald Lindberg*, on sandy bank, vicinity of Lojo, Nyland, Finland, August 20, 1893 (Cop.); *idem* 973 p.p., edge of ditch, vicinity of Jorois, etc., Prov. Mikkelin (Prov. St. Michel), Finland, August 23, 1911 (Cop.; Del., 2 sheets; Kew, cum *eodem* 974 commixt.; Mo.); *C. O. Lindholm & V. G. Wenersborg*, Sweden, August, 1894 (Berl.) and July, 1895 (Cop.; N.Y.); *Lorenzen* 4108, swampy places at Borsholm near Helsingör (Elsinore), Zealand, Denmark, August, 1896 (Berl.; Boiss.; Del.; Mun.; Mus. V.; U.V.); *E. Martin* 311*bis*, Dept. Loir-et-Cher, France, September, 1882 (Del.; U.V.); *Maximowicz*, Amur, Siberia (Berl.; Mus. V.); *E. Michalet*, France, August, 1845 (Boiss., sub nom. *Bidente fastigiata* Mich.); *idem* (*Herb. Mich., Fasc.* 1, 27), Pleurre, Canton Chaussin, Dept. Jura, France, October 14, 1853 (Par., sub nom. *Bidente fastigiata* Mich.) and September 25, 1854; *idem*, pond, Fays Champrougier, Canton Sellières, Distr. Poligny, Dept. Jura, August 28, 1855 (Coss., sub nom. *B. fastigiata* Mich.); *idem*, cantons of Chaussin and Sellières, Dept. Jura, 1853, 1855, etc. (Del.; Kew; Mus. V.; Par.; sub nom. *B. fastigiata* Mich.); *idem*, Distr. Poligny, Dept. Jura, 1855 (Par., sub nom. *B. fastigiata* Mich.); *idem* (*C. Billot Fl. Gall. exsicc.*) 2088, Canton Chaussin, Dept. Jura,

[1] The printed label for the Kihlman plant gives the following important distributional note: "In Finlandia austro-orientali frequens, media in Finlandia usque ad c. 63° etiam satis frequens et multis plagis frequentior est quam *B. tripartitus*. In austro-occidentali parte minus frequenter vel sat raro crescit. In Alandia adhuc nunquam lectus est. In vicinitate septentrionalis partis Sinus Bottnici usque ad 65° 50′ plurimis locis adnotatus est, in australis partis vicinitate adhuc non est lectus."



BIDENS SCHAFFNERI (Gray) Sherff

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September–October, 1856 (Mus. V.); *H. Mortensen*, vicinity of Birkeród, Denmark, September 9, 1871 (U.V.); *idem*, Denmark, August 14, 1882 (Mus. V.); *idem*, Denmark, August 4, 1889 (Mo.); *A. S. Oersted*, Denmark, 1865 (Cop.); *J. Paczoski*, in flooded places, Borysth. Lubecz, Distr. Gorodnia, Government of Chernigow (Chernigof), Little Russia, August 11, 1892 (Boiss.; 1–2 dm. alta, sub nom. var. *borysthenica* Paczoski); *N. E. Petersen & Joh. Lange* 68, peaty places and drained marshes at Viedams Mose and in the drained lake Klare So near Hellebaek (Holbaek), Zealand, Denmark (Berl.; Cop.; Kew; Mun.; Mus. V.); *K. Polák*, Lake Duda, Sobeslau, Bohemia, August, 1877 (Del.); *Przewalski*, at Lake Khanka (Lake Hanka), Manchuria (Berl.; Flor.); *S. Salm*, Königswart near Marienbad, Bohemia, October 8, 1910 (Cop.); *Fr. Schmidt*, Sakhalin (Sagalien, Sachalin), Japan, 1860 (Kew); *Schumann*, Peilau near Reichenbach, Silesia, September, 1870 (Kew) and September, 1872 (Mus. V.); *idem*, at margin of fish pond, eodem loco, September, 1874 (Mus. V.); *A. Schwarz* 1466, alt. 282 meters, in drained pond, Dechsendorf near Erlangen, Bavaria, September 1–11, 1912 (Del.; Gray; Mun.); *Alois Teyber*, in wooded places, Hoheneich, Lower Austria, August 30, 1905 (Mus. V.); *idem*, banks of pond, wooded area, eodem loco, September 3, 1905 (U.V.); *idem*, wooded areas, peat moor, etc., Lower Schrems, Lower Austria, August, 1906 (U.V., 2 sheets); *idem*, wooded areas, Heidenreichstein, Lower Austria, August, 1908 (U.V.); *idem*, Gopprechts near Litschau, Lower Austria, August, 1908 (U.V.); *J. L. Thuillier* (Del., auctoris exemplum pro Fl. Env. Par. ed. 2, anno 1799); *Karl Tocl*, pond, Wittingauer Becken, southern Bohemia, July 31, 1902 (Berl., sub nom. *Bidente radiata* f. *perpusilla* Dom.); *D. L. Topping* 2365, Vladivostok and vicinity, Siberia, May–October, 1919 (U.S.); *Turczaninow*, at the Argun River, Dahuria (Daur, Dauria), Siberia, 1833 (Del., sub nom. *Bidente tripartita β. pinnatifida*); *Velenovsky*, abundant on shores of the Pilsky Pond, Blatná District, Bohemia, August 16, 1882 (Mus. V.); *X. Vendrely & J. Paillot* 2088*bis*, dried mud at edge of pond at St. Hubert, 10 km. north-northeast of Rambouillet, Dept. Seine-et-Oise, France, September 15, 1872 (Mo.; hic unus duorum originalium locorum a Thuill. datorum); *F. Vierhapper*, wooded places, shore of pond at Heidenreichstein, Lower Austria, September, 1915 (Mus. V.); *Ant. Weidmann*, Lomnitz, Bohemia, July 14, 1883 (Mus. V.); *idem*, Rybnyk, etc., Silesia, July 28, 1885 (U.V.); *Otto Wellenius*, Prov. Tavastehus, Finland, September 10, 1898 (Cop.).

In general habit *Bidens radiata* is intermediate between *B. cernua* and *B. tripartita*. The several authentic original specimens of *B. fastigiata* Mich. in various herbaria are identical with one from Oersted's type collection of *B. platycephala* (Cop.), and with others from Thuillier's type collection of *B. radiata* (Del.; Par.). Indeed, Oersted himself compared these three species and found them identical.[1] Mérat (loc. cit.) reduced the Thuillier species to varietal rank under *B. tripartita* L. (var. *C*), but, more than three decades before, Lamarck and DeCandolle (loc. cit.) had given much the same treatment, publishing the name *B. tripartita* var. γ. By modern authors, *B. radiata* is commonly ranked as a separate species, and with good reason. Only rarely is there any difficulty in distinguishing it from *B. tripartita* and even then the forms examined appear to be hybrids. Thus Schube (Theod., Verbr. Gefässpl. Schles. 315. 1903) considered an intermediate form studied by him to be a hybrid. Likewise did Collin (Medd. Soc. Fauna et Flora Fennica 1886: 255. 1886) regard a certain intermediate form. Teyber (Verh. Zool. Bot. Ges. Wien 56: 74. 1906) proposed the name *Bidens fennica* for these hybrids. Teyber's specimens (*Alois Teyber*, in forested areas, Hoheneich, Lower Austria, September 9, 1905, type; *idem*, peat moor at Schrems, L. Austria, August, 1906; *idem*, forested areas, Gopprechts near Litschau, L. Austria, August, 1908; *idem*, forested areas, Hoheneich, L. Austria, August, 1906; *idem*, forest, Frommberg near Kirchberg, L. Austria, August, 1908; *idem*, forested areas, Heidenreichstein, L. Austria, August, 1908—all in U.V.) are intermediate between *B. tripartita* and *B. radiata*.[2] Thuillier himself appears to have suspected the occurrence of hybridity here. This is shown in his

[1] For a more extended discussion see the classic treatment by G. Schweinforth, Verh. Bot. Vereins Brand. 2: 142–152, etiam 226–227 et 2 tabulae. 1861 (issued by the author also separately and thus available in certain libraries as a separate with the illustrations differently placed). Cf. Körnicke, Bonplandia 8: 222–227. 1860; etiam Oesterr. Bot. Zeit. 13: (181) 381. 1863.

[2] Additional specimens similarly construed by their collectors, apparently with justice, are: Sweden: *H. A. Fröding*, Sunne, Sundsvik, Vermland, Sept. 17, 1910 (Cop.); *A. Hülphers*, eodem loco, Aug. 20, 1914 (Berl.). Finland: *Harald Lindberg* 973 pro parte, edge of ditch, vicinity of Jorois, etc., Prov. Mikkelin, Aug. 23, 1911 (Kew, quo cum *Lindbergii* 974 commixt.); *idem* 974, among *B. radiata* and *B. tripartita* on bank of Lojo, Sept. 3, 1911 (Cop.; Kew; Mo., 2 sheets). Bohemia: *Velenovsky*, growing with both parents, shores of pond, Pilsky near Cekanic, Aug. 16, 1882 (Mus. V.). Styria: *Hayek* 3795 p.p., marshy places in forests, etc., Hochenegg (Kew).

B. tripartita f. *fastigiata* A. Franchet (Plant. David. 1 [Plant. Mongol.]: 165. 1884) apparently belongs with these hybrid forms: "478.—B. tripartita, L. L. Sp., 1165.—Forma *fastigiata*. Mongolie: Géhol, dans les marais; (n° 2115*bis*). Rameaux dressés, etroitement fastigiés; capitules entourés de longues feuilles bractéales rayonnantes. Port du *B. radiata* Thuill.; mais les achanes sont tout à fait ceux du *Bidens tripartita*."

description and naming (loc. cit.) of a *Bidens hybrida*,[1] which he differentiated from *B. tripartita* L. It happens that Thuillier specimens of *B. hybrida* are still extant in good condition at Paris (Par.), Berlin (Willd.), and Geneva (Del.). The Paris specimen was formerly in the herbarium of Dr. F. V. Mérat and bears the name "*Bidens hybrida* Thuillier" written probably (according to an oral statement by the late Mr. Louis Anfray of the Museum of Natural History of Paris) by Thuillier himself. It is much closer to *B. radiata* than to *B. tripartita* (with the var. *typica* of which latter it had been erroneously equated by Beck von Mannagetta, Fl. Nied. Oesterr. 2: 1191. 1893). The Berlin specimen is numbered 15013–5. Willdenow had labeled it "*Bidens tripartita?*" It is true *B. radiata.*

The official Thuillier set of specimens, however, is the set at Geneva (fide Lasègue, Mus. Bot. Deless. 72. 1845). The type of *B. hybrida* there preserved is, without question, of hybrid origin. It is purple-stemmed like *B. tripartita* but in the greater number and the character of the achenes is closer to *B. radiata.*[2]

B. radiata has been mistaken by many botanists for a form or variety of *B. tripartita* L. *B. tripartita* var. *pinnatifida* Turcz. ex DC. was based upon a plant collected in 1833 at the Argun River, Dahuria (southwest of Lake Baikal, Siberia). The type specimen (Del.) is positively *B. radiata. Bohnhof* 186, widely distributed to herbaria as a specimen of *B. tripartita* var. *pinnatifida,* is purely *B. radiata.* It is very likely that C. F. Schultz (Prodr. Fl. Stargard. 208. 1806) had *B. radiata* in mind when he described a form under *B. tripartita* as follows: "1. Lacinia foliorum intermedia pinnatifida.—cum praecedente [*B. tripartita*] promiscue occurrit." At even an earlier date, Roth (Tent. Fl. Germ. 2, pt. 2: 301. 1793) stated under *B. tripartita:* "Variat 1. *Lacinia* foliorum *intermedia* pinnatifida."

[1] *B. tripartita* var. β. Lam. & DC. Fl. Fr. ed. 3. 4: 219. 1805; *B. tripartita* γ. *hybrida* (Thuill.) DC. Prodr. 5: 594. 1836; *B. tripartita* var. B, F. V. Mérat, Nouv. Fl. Env. Par. ed. 4. 2: 370. 1836; cf. var. *partita* Peterm. ex Beckhaus, Fl. Westfal. 582. 1893; cf. Fiori in Fiori & Paoletti, Fl. Anal. Ital. 3: 302. 1904.

Thuillier's original treatment follows: "*Hybrida.* I. *B. foliis subpinnato-5-partitis; laciniis longo-lanceolatis.—Habitus* B. tripartitae.

"*Habitat in paludibus. Flores spurco-lutei; Julio, Augusto* . . . [annua] . . . .

"I. Bident Hybride. Feuilles souspinnées à cinq. parties. Lanières ou folioles longuement lancéolées. Du reste ressemble à l'espèce appelée *Bidens 3-partita.* Fleurs d'un jaûne-sale; en Juillet et Août. Se trouve dans l'étang de Marcoussis, côté du pavillon de chasse."

[2] Touching the occurrence of hybridity between *B. radiata* and *B. tripartita* we may add the observation of Prof. Karel Domin of Prague, who states (in lit. in Herb. Berl., cum suo specimine *B. radiatae* f. *perpusillae* Dom.) that where the two species grow together in southern Bohemia they almost always hybridize.

B. foliosa Willd. was listed as an "annual. Growing always in the open." It was listed later by Link (Enum. Pl. Hort. Berol. 305. 1822) and by J. L. Loudon (loc. cit.), the latter giving a more extended description and evidently having seen authentic material. The type in the Willdenow Herbarium at Berlin is Herb. Willd. No. 15020–5. Ascherson, in 1869, had labeled it "*B. radiata* Thuill. fol. indivisis." A duplicate sheet in the Berlin Herbarium bears three plants all with leaves likewise simple. The achenes on all four plants are typical for *B. radiata*, with which the name *B. foliosa* must be considered synonymous. The reason for Willdenow's name *foliosa* is hardly apparent until one examines the duplicate specimen in Vienna (Mus. V.). This is a spray with gigantic leaves, which measure up to more than 2.1 dm. long. One leaf is tripartite, with the terminal leaflet oblong-lanceolate; the others are simple. This mostly simple-leaved form of *B. radiata* is much rarer than are simple-leaved forms of the sister species, *B. tripartita*.

B. radiata f. *perpusilla* Dom. is represented in Berlin by a packet of four tiny plants, 3–6.5 cm. tall. These are so diminutive and indistinctive of *B. radiata*, as opposed to *B. tripartita*, that were it not for an authoritative determination by Domin, one might well hesitate at referring them positively to either species. In keeping with my policy of rejecting all such forms, dwarfed temporarily because of peculiar conditions in the habitat, the forma *perpusilla* is here reduced to synonymy with the species proper.

EXPLANATION OF PLATE LXIX, FIGS. *a–g*

Bidens radiata: a, fruiting specimen, ×0.63; *b*, exterior involucral bract, ×3.77; *c*, interior involucral bract, ×3.77; *d*, palea, ×3.77; *e*, disc floret, ×3.77; *f* (outer), *g* (inner), achenes, ×3.77; all from *Michalet* 27, in Hb. Kew.

91. **Bidens amplissima** Greene, Pittonia 4: 268. 1901. Pl. LXXI.

Bidens cernua var. *elata* Torr. & Gray, Fl. N. Amer. 2: 352. 1842.

Bidens elata (Torr. & Gray) Sherff, Bot. Gaz. 59: 312. 1915.

Annua, ramosa, 5–10 dm. alta; caule plerumque robusto, obtuse quadrangulato, scabrido vel interdum fere usque ad apicem subglabrato. Folia sessilia vel inferiora breviter alato-petiolata, 0.8–2 dm. longa, membranacea, glabra, ciliata, superiora indivisa, cetera profunde pinnatimque tripartita; lamina indivisorum vel foliolis tripartitorum elliptico-lanceolatis, profunde atque acerrime incisis vel incisodentatis, duobus lateralibus foliolis in petiolum vel costam medianam connato-decurrentibus. Capitula erecta vel subcernua, pauca, incon-

spicue radiata, pansa ad anthesin ± 2.5 cm. lata et ± 1.2 cm. alta, breviter pedunculata pedunculis usque ad 3 cm. longis. Involucrum basi saepe hispidum; bracteis exterioribus circ. 8–10, foliaceis, ciliatis, nunc lineari-lanceolatis integris et circ. 1–2 cm. longis, nunc elongatis incisis et usque ad 7.5 cm. longis; interioribus ovato-lanceolatis, demum 8–12 mm. longis. Flores ligulati 8–11, parvi, flavidi, ligula elliptico-oblongi, apice saepe denticulati, 3.5–8 mm. longi. Achaenia cuneata, obcompressa vel subplana, olivaceo-viridia, marginibus costisque medianis retrorsum hamosa, aliter glaberrima vel raro faciebus minime pubescentia, corpore exteriora circ. 5 mm. longa et sub apice 2.3–2.6 mm. lata, interiora 5.5–7 mm. longa et 1.5–2 mm. lata, omnia bi- quadri- (fere semper tri-) aristata, aristis suberectis, subrobustis, retrorsum hamosis, 2–4 mm. longis.

Type specimen: Collected by *John Macoun* (No. 73), in wet places along Lomas River, Vancouver Island, British Columbia, August 12, 1887 (Greene).

Distribution: Vancouver Island, British Columbia.[1]

Specimens examined: *W. R. Carter*, Quamichan, August 22, 1917 (Gray); *Hooker*, Northwest Coast of North America, communic. January, 1835 (Gray); *Macoun* (73), Lomas River, August 12, 1887 (type, Greene: cotypes, Can., ubi etiam locus Alberni datur; Gray, sub *Macounii* num. 73); *idem*, Lost Lake, near Victoria, July 2, 1908 (Can.); *Scouler*, Strait of Juan de Fuca (Brit.; Kew; N.Y.).

An excellent specimen of this species, collected by Dr. Scouler at the Strait of Juan de Fuca, is in the Torrey Herbarium, now included in the Herbarium of the New York Botanical Garden. It is identical with the Scouler specimen of Hooker's herbarium (now in Kew), a specimen referred by Hooker (Hook. Fl. Bor. Amer. 1: 314. 1833) to *B. Chrysanthemoides* Michx. (but entirely distinct from Michaux's two type specimens at Paris). It is identical also with the type and cotype specimens of *B. amplissima* Greene. It is very different from the type (cf. Sherff, Bot. Gaz. 59: 313, *fig. 2.* 1915) of *B. quadriaristata* DC. var. *dentata* Nutt. (Brit.), a plant cited synonymously by Torrey and Gray, but probably never seen by them, as indeed their failure to use their customary exclamation marks would partly imply.

Wiegand (Bull. Torr. Bot. Club 26: 412. 1899), following Torrey and Gray's treatment, likewise equated these two forms. Assuming

[1] Sauvies Island, Oregon, is cited by Piper and Beattie (Fl. Northwest Coast 375. 1915) for this species. Their citation is clearly based, however, upon Nuttall's type plant (Brit.) of *Bidens quadriaristata* var. *dentata*, collected by Nuttall upon "Wappatoo Island" (now Sauvies Island) at the outlet of the Willamette River, Oregon, and which is merely a form of *Bidens cernua*.

the correctness of this equation, he employed the name *Bidens dentata* (Nutt.) Wieg. for the species. Greene (loc. cit.) justly denied the identity of the two, although he had not seen Nuttall's type.[1]

Wiegand (loc. cit.) regarded the Macoun plant as representing a very good species, standing, in structural characters, "almost intermediate between *B. cernua* and *B. comosa* on the one hand and between *B. cernua* and *B. frondosa* on the other." To me it has presented some difficulty. While locally restricted in distribution and usually easy to distinguish from related species,[2] its peculiar aspect has inspired the suspicion that ultimately it will be proved to be of hybrid origin.

The name *Bidens elata*, advanced in 1915 as a synonym for Torrey and Gray's var. *elata*, is at variance with the International Rules and must be dropped (cf. Sherff, Bot. Gaz. 61: 504. 1916).

EXPLANATION OF PLATE LXXI

Bidens amplissima: a, flowering and fruiting specimen, ×0.61; *b*, *c*, tripartite leaves, ×0.61; *d*, exterior involucral bract, ×1.83; *e*, interior involucral bract, ×1.83; *f*, ray corolla, ×1.83; *g*, palea, ×1.83; *h*, disc floret, ×6.14; *i*, achene, ×2.44; *a*, *b*, *d–i*, from *Dr. Scouler*, Strait of Juan de Fuca (type and cotype specimens of *Bidens cernua* var. *elata* Torr. & Gray), in Hb. N.Y. and Hb. Kew; *c*, from *John Macoun* 73 (cotype), in Hb. Gray.

92. **Bidens cernua** L. Sp. Pl. 832. 1753.[3] Pl. LXXII, figs. *a* and *d–k*.

Coreopsis Bidens L. op. cit. 908.

Bidens minima Hudson, Fl. Angl. 310. 1762 (probabiliter maxima ex parte); cf. L. Sp. Pl. ed. 2. 2: 1165. 1763.[4]

[1] Which, as stated in p. 297, footnote 1, was a mere form of *Bidens cernua* L.

[2] The Macoun specimen in London (Brit.) is a curious, freakish one seemingly allied with *B. connata*.

[3] The name *Bidens conica* L. op. cit. 833, is clearly a misprint for *B. cernua*.

[4] Hudson's description, "*minima*. 3. Bidens foliis lanceolatis sessilibus, floribus seminibusque erectis. *Verbesina minima* Cat. giss. 167. app. 66. R. Syn. 188. t. 7. f. 2 . . . ," is unsatisfactory and does not distinguish between the dwarf forms of *B. cernua* L. and *B. tripartita* L., both of which are common in the English flora. While Hudson cites Dillenius' synonym (Cat. Giss.) first, the vague treatment given by Dillenius leaves little doubt that Hudson's concept was based primarily on the cited figure in Ray's *Synopsis*. In fact, it is seen on turning to Ray (loc. cit.) that Ray himself cited "Dill. Cat. Giss. 167 & App. 66," and evidently Hudson, in citing Ray, merely took the Dillenian synonym from Ray but cited it first for better historical sequence.

Under these circumstances it seems only right to stop with the reference in Ray, discarding all earlier ones. Ray's crude and inexact figure shows a seemingly

Coreopsis Ridens Gunn. Fl. Norv. 2: 87. 1772 (sphalm).

Bidens tripartita var. *minima* Hudson, Fl. Angl. ed. 2. 355. 1778 (probabiliter maxima ex parte).

Coreopsis quadricornis Krocker, Fl. Silesiae 2, pt. 2: 481. 1793.

Bidens cernua var. *Coreopsis Bidens* Willd. Sp. Pl. 3: 1717. 1804.

Bidens cernua var. *radiata* Roth, Tentamen 1: 351. 1788.

Bidens cernua var. *Bidens minima* J. E. Smith, Eng. Fl. 3: 400. 1825.

Bidens cernua var. *discoidea* Wimm. & Grab. (cum formis *glabra* et *hispida*), var. *radiata* formae *glabra* Wimm. & Grab. et *hispida* Wimm. & Grab., et var. *nana* Wimm. & Grab. Fl. Silesiae 2: 117. 1829.[1]

radiate head. As radiate heads are exceedingly rare (I have never seen any) in *B. tripartita* but very common in *B. cernua*, it would appear that the plant was probably a dwarfed form of *B. cernua*. In such case, however, the biaristate achene shown by Ray is strongly atypic, so much so that DeCandolle (Prodr. 5: 594–595. 1836), with apparent reliance upon the delineator's fidelity to nature, referred the Ray figure to a variety *tenuis* of *B. tripartita* and excluded it from his concept of *Bidens cernua* var. *minima*. (Cf. Ruprecht, Fl. Ingric. 1: 564. 1860: "in fig. apud Rajum achaenia tantum incuria pictoris biaristata videntur, nam planta ex habitu ad V. integrifoliam [=B. cernua] pertinet." Cf. etiam Neilreich, Fl. Nied.-Oesterreich 339. 1859, sub *B. cernua:* "Ob B. minima Huds. Fl. angl. ed. I. p. 310, L. Spec. ed. II. p. 1165 hierher oder zu *B. tripartita* gehört, ist zweifelhaft, weil die Abbildung der *Verbesina minima* in Raii Syn. brit. p. 188 t. 7 f. 2, auf die sich Hudson beruft, die sitzenden Blätter der *B. cernua* und die 2grannigen Achenen der *B. tripartita* darstellt.")

Hill (Brit. Herb. 461, *pl. 66, fig.* Dwarf hemp agrimony. 1756) reproduced Ray's figure very exactly. He described the plant under the name Dwarf Hemp-Agrimony and cited Ray's name *Verbesina minima*. In the copies of Hill's work which had the plates colored (e.g., in Libr. Field Mus.), a definitely radiate effect is secured by bright yellow coloring, making the plant appear unmistakably as *B. cernua*. Later, Hill (Veg. Syst. 3:123, *pl. 89, fig. 7.* 1761) renamed the Dwarf Hemp-Agrimony, *Bidens Dilleniana*, evidently with Dillenius' authorship of the early name *Verbesina minima* in mind (cf. Sherff, Bot. Gaz. 64: 30. 1917). In his later publication, however, Hill gave a poor illustration with the leaves more oval and the head undistinctive. He altered the description just slightly (calling the leaves oval, rather than oblong as at first). Thus is introduced an element of doubt as to whether Hill really distinguished between the dwarf forms of the two species, *B. cernua* and *B. tripartita*.

Many authors, realizing the confusion that has existed here, have treated the two dwarf forms collectively without effort toward distinction. Thus H. Steinworth (Pl. Fl. Luneb. 106. 1849) states: "Von beiden Arten [i.e., *B. tripartita* and *B. cernua*] auf Torfboden nicht selten eine Zwergform: minima L." Retzius (A. J., Obs. Bot. fasc. 1: 28. 1791) had long before cautioned against confusion in this matter: "B. tripartita L. var. *β. pumila* teneraque caule simplicissimo unifloro, quam pro *minima* Sp. Pl. 1165, ne habeant Tirones moneo."

We may note, in passing, that Hudson himself did not distinguish very carefully here. This is shown by the fact that while in his first edition he cited synonyms that would indicate his having a form of *B. cernua* L. in mind, he later reduced his *B. minima* to varietal rank under *B. tripartita*.

Bidens cernua subvar. *minima* (L.) Coss. & Germ. (Fl. Paris ed. 2. 488. 1861) was based directly upon *B. minima* L. So also, probably, was *Coreopsis minima* Hort. ex Steud. (Nom. ed. 2. 1: 420. 1840).

[1] Wimmer and Grabowski (loc. cit.) do not indicate whether the names *glabra* and *hispida* are meant technically for subvarieties or formae. Briquet and Cavillier (Fl. Alp. Marit. 6: 220 and 326. 1917) give them as formae.

Bidens cernua var. *minima* DC. Prodr. 5: 595. 1836.[1]

Bidens cernua var. *C*, F. V. Mérat, Nouv. Fl. Env. Par. ed. 4. 2: 370. 1836.

Bidens quadriaristata var. *dentata* Nutt. Trans. Amer. Phil. Soc. ser. 2. 7: 368. 1841; cf. Sherff, Bot. Gaz. 59: 313, *fig. 2*. 1915.

Bidens mixta Kittel (pro var. *B. cernuae!*), Taschenbuch Fl. Deutschl. ed. 2. 2: 626. 1844.

Bidens cernua var. *rugosa* Coss. & Germ. Fl. Paris ed. 1. 395. 1845.

Bidens cernua f. *radiata* (Roth) et f. *minima* (Huds.) Larsson, Fl. Wermland 220. 1859 (cf. Sherff, Bot. Gaz. 64: 31. 1917; cf. Briq. & Cavill. Fl. Alp. Marit. 6: 220 and 326. 1917).

Verbesina integrifolia Ruprecht, Fl. Ingrica 1: 564. 1860.

Verbesina minima Dillen. ex Rupr. loc. cit.

Bidens cernua subvar. *rugosa* Coss. & Germ. Fl. Paris ed. 2. 488. 1861.

Bidens cernua var. *ligulata* Bonnet, Pet. Fl. Paris 211. 1883.

Bidens cernua var. *natans* Osswald & Sagorski ex E. Sagorski, Mittheil. Thür. Bot. Verein ser. nov. 2: 23. 1892.

Bidens cernua vars. *typica* et *radians* (cum f. *mixta* [Kitt.]) Beck von M. Fl. Nied. Oesterr. 2, pt. 2: 1191. 1893.

Bidens dentata (Nutt.) Wieg. Bull. Torr. Bot. Club 26: 412. 1899 (ex synon. Nutt.).

Bidens cernua var. *elliptica* Wieg. op. cit. 417.

Bidens cernua var. *integra* Wieg. op. cit. 418.

Bidens cernua var. *Bidens* Farwell, Ann. Rep. Comm. Parks and Boulevards, Detroit 11: 91. 1900.

Bidens gracilenta Greene, Pittonia 4: 255. 1901.

Bidens ciliolata Greene, op. cit. 256.

Bidens prionophylla Greene, loc. cit.

Bidens glaucescens Greene, op. cit. 258.

Bidens lonchophylla Greene, loc. cit.

Bidens Macounii Greene, op. cit. 259.

Bidens Cusickii Greene, loc. cit.

Bidens leptopoda Greene, op. cit. 260.

[1] DeCandolle rejected Ray's plant as a synonym (see p. 298, footnote 4) and introduced *Bidens minima* L. only interrogatively. He rested his plant directly upon Fl. Dan. *pl. 312*. Since, as shown in p. 298, footnote 4, Hudson's text for Hudson's *minima* involves a doubtful concept or probably two concepts intermixed, it is unwise to set this name off as "*B. cernua* var. *minima* (Huds.) DC." as has been done occasionally (e.g., Fern. & St. John, Rhodora 17: 25. 1915; Fern. ibid. 24: 207. 1922).

BIDENS FERULAEFOLIA (Jacq.) DC.

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Bidens marginata Greene, op. cit. 262.

Bidens leptomeria Greene, op. cit. 264.

Bidens Kelloggii Greene, op. cit. 267.

Bidens cernua var. *elatior* Torr. ex Greene, op. cit. 268.

Bidens cernua var. *genuina* Rouy, cum subvars. *rugosa* (Coss. & Germ.) Rouy et *ligulata* (Bonn.) Rouy, Fl. France 8: 217. 1903.

Bidens cernua var. *monocephala* Zersi ex Fiori in Fiori & Paoletti, Fl. Anal. Ital. 3: 301. 1904.

Bidens elliptica (Wieg.) Gleason, Ohio Nat. 5: 317. 1905.[1]

Bidens graveolens Kom. Bull. Jard. Imper. Bot. (Leningrad) 16: 178. 1916.

Bidens cernua f. *discoidea* (Wimm. & Grab.) Briq. & Cavill. Fl. Alp. Marit. 6: 220. 1917.

Bidens cernua f. *ligulata* (Bonn.) Briq. & Cavill. loc. cit.

Bidens cernua f. *typica* (Beck v. M.) Briq. & Cavill. loc. cit.

Bidens filamentosa Rydb. Fl. Pr. Plains Cent. N. Amer. 850. 1932.

Folia in apices longe acuminato-attenuatos angustata, primaria acriter serrata 4–24 jugis dentium; involucri bracteis exterioribus circumambitu a lineari usque ad lanceolatum, apice acutis vel subacutis.....*B. cernua* sensu stricto.

Folia apice plerumque obtusa vel rotundata, primaria integra vel dentata 1–6 jugis dentium remotorum; involucri bracteis exterioribus circumambitu a oblongo usque ad spathulatum, apice obtusis vel rotundatis.....var. *β. oligodonta.*

Herba annua, erecta, breviter ramosa, 1–9 dm. alta, ramis suberectis vel adscendentibus; caule subtereti, glabro vel scabrido-hispido, purpurascenti vel stramineo (saepe pallidissimo). Folia normaliter opposita (rarissime verticillata), normaliter sessilia, indivisa (rarissime 1 vel 2 lobis lateralibus 2–3-partita), marginibus sparsim ciliata, aliter glabra, lineari-lanceolata vel lanceolata, apice acuminata, inaequaliter serrata, basim versus saepe angustata, basi connata, 4–17 (–22) cm. longa. Capitula primum saepe erecta sed demum cernua, ligulata vel discoidea, pansa ad anthesin 1–5 cm. lata et 0.6–1.2 cm. alta (ligulis non adjectis tantum 1–2 cm. lata). Involucrum basi hispidum; bracteis exterioribus 5–8, foliaceis, linearilanceolatis, subsparsim aciculato-ciliatis, inaequalibus, patentibus, capitulo plerumque longioribus; interioribus valde membranaceis,

[1] Pre-Linnean synonymy is as follows: *Bidens folio non dissecto* Caesalp. De Plantis 16: 488, cap. XVII. 1583; *Bidens folio non dissecto* Tourn. Instit. 462. 1719; *Bidens corona seminum retrorsum aculeata, foliis amplexicaulibus, floribus nutantibus*, L. Fl. Suec. 239 (No. 664). 1745.

ovato-lanceolatis vel obovato-lanceolatis, capitulo non longioribus. Flores ligulati (si praesentes) 6–8, flavi, ligula ovato-lanceolati, apice acuti vel minute denticulati, capitulo dimidio longiores; tubulosi normaliter 5-lobati.[1] Achaenia anguste cuneata, quadrangulata, angulis retrorsum hamosa (et saepe tuberculata), corpore 5–6.5 (–7.7) mm. longa et saepe purpurascentia, apice flavida et quadriaristata aristis tenuibus retrorsum hamosis et 2–3 mm. longis.

Type specimen: A good specimen exists in the Linnean Herbarium at London, but the name *Bidens cernua* traces back by synonymy directly to Caesalpinus 16: 488, cap. XVII, to the plant there contrasted with the present *B. tripartita* and mentioned only briefly ("eodem reperitur aliquando folio non dissecto").

Distribution: In North America from British Columbia eastward to New Brunswick, Prince Edward Island, Nova Scotia, and Magdalen Islands, and southward to California, New Mexico, Tennessee, and North Carolina; in Europe throughout the British Isles and known on the continent eastward to past the 35th meridian and from Norway, Sweden, and Finland at the north to southern France, northern Italy, European Turkey, and the Crimean Peninsula at the south; in Asia known from Asiatic Turkey southward to Palestine, from British East India, from Japan and from various localities between western Mongolia and southeastern Siberia. Absent from the southern hemisphere.

Specimens examined: *Lulu F. Allabach*, LaSalle Isl., Les Cheneaux Isls., northwestern Lake Huron, August 25, 1920 (Carn.); *anon.*, loco ignoto (Linn.; sub num. 2 et nom. *cernua*); *anon.*, loco ignoto (Linn.; pro *Coreopside* et sub nom. *Bidente*, i.e., hic specimen *Coreopsis Bidens* L. est); *B. Balansa*, alt. about 1,100 meters, borders of marsh, Cesarea (Caesarea, Kaisariyeh, Kaisarieh), Palestine, September 1, 1856 (Del.); *J. Ball*, near Sneem, County Kerry, Ireland, September 20, 1859 (Gray); *E. B. Bartram* 1302, Morrisville, Pennsylvania, October 3, 1910 (Gray); *M. S. Bebb*, Fountaindale, Illinois (Field); *Henri Bernet*, Grand-Laconnex near Geneva, Switzerland, October 1866 and September, 1868 (Boiss.); *Biltmore Herb.* 138*b* p.p., swampy places, Highlands, North Carolina, September 7, 1897 (Mus. V.); *F. T. Bioletti*, Lake Merced, San Francisco, California, August, 1892 (Calif.); *C. H. Bissell* 293, Southington, Connecticut, September 23, 1892 (Gray); *idem & D. H. Linder* 22863, Pottle's Lake, North

[1] Buchenau (Abh. Senckenb. Gesellsch. Frankf. 1: 119. 1854) and Wydler (Flora 43: 516. 1860) have described tetramerous florets for *B. cernua*. In these there was a regular alternation between the calyx projections (achenial aristae), the corolla lobes, and the stamens.

BIDENS FERULAEFOLIA var. FOENICULAEFOLIA (DC.) Sherff (figs. *a–i*);
var. LUDENS (Gray) Sherff (figs. *j–s*)

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Sydney, Cape Breton Co., Nova Scotia, August 27, 1920 (Phila.); *J. W. Blankinship* 259, wet places at alt. 1,350 meters, Bozeman, Montana, August 23, 1905 (Berl.; Boiss.; Can.; Cop.; Phila.); *Bohnhof* 314, sands of Lake Hanka (Lake Kanka; L. Khanka), southeastern Siberia, August 21, 1899 (Berl.; Del.; N.Y.); *E. Bourgeau*, Saskatchewan, 1857–1858 (Berl.; Mus. V.); *Henr. Braun*, wet places at Goyss near Bruck, Hungary, September 28, 1879 (Mus. V.); *Mrs. F. A. Briggs*, Rainier, Oregon, 1893 (Phila.); *W. P. Brooks*, Southern Hokkaido, Japan, 1884 (Calif.); *H. E. Brown* 35, alt. 300 meters, near Milton, Oregon, August 26, 1896 (Del.; Phila.); *A. B. Burgess* 319, swampy ground near creek, Prairie Rhonde, Michigan, September 25, 1903 (Field); *B. F. Bush*, Courtney, Missouri, September 27, 1893 (U.V.); *idem* 34, eodem loco, September 11, 1892 (Gray; forma pro var. *integra* Wieg. determinavit K. M. Wiegand); *idem* 165, river banks, Jackson Co., Missouri, September 28, 1893 (Field; Kew); *idem* 807, bottoms, Courtney, Missouri, September 11, 1899 (Gray; Mo.); *idem* 1887, eodem loco, September 22, 1903 (Gray); *Fr. Castella*, peat bogs, Lentigny, Canton Fribourg, Switzerland, September 10, 1902 (U.S.); *Girard de Césarée*, Vilayet of Sivas, Asiatic Turkey, September 7, 1893 (Boiss.); *E. B. Chamberlain & L. O. Eaton*, quaking bog, East Livermore, Maine, August 27, 1904 (Gray; planta minima); *R. W. Chaney* 249, Hamlin Lake, Mason Co., Michigan, September 18, 1910 (Field); *Agnes Chase* 2733, islets of Potomac River near Cabin John, Maryland, October 5, 1904 (Field); *June A. Clark* 298, pond margin, Boise, Idaho, August 26, 1911 (Can.; Del.; Field); *D. Clarke* 29, Flint, Michigan (Carn.); *Fred Clements* 2920, Ainsworth, Nebraska, August 29, 1893 (Gray); *L. Corbière*, Cherbourg, France, September 26, 1886 (U.S.); *F. V. Coville* 1341, shore of Klamath Lake between Modoc Point and mouth of Williamson River, Oregon, August 29, 1902 (U.S.; forma a *Leibergii* 689 non differt); *W. C. Cusick* 1408, bogs, etc., Oregon, August, 1886 (U.S.; type material of *Bidens lonchophylla* Greene); *idem* 1453, Oregon (Field); *idem* 1768, tules of the Grand Rond Valley, Oregon, August, 1897 (Field; Kew; type collection of *Bidens Cusickii* Greene); *H. E. Day* 402, Manchester, Vermont, September 6, 1898 (Gray); *Dimonie*, along bodies of water near Ohrida, Macedonia, European Turkey, July, 1908 (Mus. V., 2 sheets; U.V.); *Duftschmid*, grassy meadows near Waldhausen, Upper Austria, August 20, 1856 (Mus. V.); *D. L. Dutton*, Brandon, Vermont, September 5, 1921 (Carn.); *Alice Eastwood* 48, along Platte River, Denver, Colorado, August 18, 1910 (Gray; Kew); *F. Elmquist* 3981, in marshes, Ostro-

gothie, Brenas, Sweden, July 25, 1896 (Boiss.; Del.; Mus. V.; U.V.); *Evers* 477, shaded ditches at Madonna Mariellia, Monfalcone, Coastland (Küstenland), September 6, 1903 (Mus. V.); *Urbain Faurie* 3138, Plain of Sapporo, Japan, September 12, 1888 (Kew); *Favrat*, Marécages, Switzerland, September 3, 1873 (U.V.); *E. Faxon*, near Boston, Massachusetts, October, 1883 (Gray; formam pro var. *elliptica* Wieg. determinavit K. M. Wiegand); *M. L. Fernald*, woodland pool, Somesville, Mt. Desert Isl., Maine, September 21, 1892 (N. Eng.; planta minima); *idem, Long, & St. John* 8210, Etang du Nord Village, Grindstone Isl., Magdalen Isls., Quebec, August 15, 1912 (Gray); *iidem* 8211, wet bogs and mossy pond margins among sandhills, Coffin Isl., Magdalen Isls., Quebec, August 17, 1912 (Gray; planta minima); *iidem* 8212, North Lake, Kings Co., Prince Edward Isl., Aug. 24, 1912 (Gray); *iidem* 8213, Dundee, Kings Co., Prince Edward Isl., August 26, 1912 (Gray); *iidem* 8214, Southport, Queens Co., Prince Edward Isl., August 28, 1912 (Gray); (*Fernald & St. John* 11211, formerly referred to *B. cernua* proper, is var. *obligodonta*, q.v.); *G. L. Fisher*, St. Thomas, Ontario, September 13, 1908 (U.V.); *J. Fowler*, Kingston, Ontario, September 12, 1899 (Field); *Friedrichsthal* 1086, Lake Ledes near Saloniki, Macedonia, European Turkey (Mus. V.); *R. Frohock*, Malden, Massachusetts, August, 1880 (N. Eng.; forma nonnullis foliis 2–3-partitis foliolis lateralibus ovatis subacuminatis infra in petiolum decurrentibus); *H. E. Garnsey* 455, vicinity of Oxford, England, 1876 (U.V.); *F. C. Gates* 2002, Urbana, Illinois, September 26, 1907 (U.S.); *L. N. Goodding* 495, edge of a pond, Lower Canyon Creek, Big Horn Co., Wyoming, August 6, 1901 (Field); ex herb. *Gulielmi Gourlie, Jr.*, vicinity of Glasgow, Scotland (Berl.); *G. B. Grant* 106, Sisson, northern California, September, 1902 (Del.);[1] *J. M. Greenman* 543, Dry Fork River, near Harman, West Virginia, September 12, 1904 (Field); *A. A. Heller* 11718, alt. about 1,140 meters, vicinity of Deetz Station near Black Butte, Siskiyou Co., California, August 25, 1914 (Del., 2 sheets; Field; Penn.); *idem & E. G. Halbach* 600, Long Pond, Luzerne Co., Pennsylvania, September 16–17, 1892 (Boiss.); *L. F. Henderson* 3855, Salmon, Idaho, August 31, 1895 (U.S.; type of *Bidens marginata* Greene); *Herb. Ingricae* Cent. III, 309, in marshes and at edges of streams, Government of Leningrad, Russia, September, 1860 (Field); *idem* Cent. VIII, 309*b*, in ditches and marshes,

[1] Grantzow has two sheets (Del.) of simple-leaved *Bidens tripartita* from Prenzlau, Germany (ditches at Hindenburg, only under the parents), August, 1876, labeled *B. tripartita* × *B. cernua;* also additional sheets labeled August, 1875, and August, 1876 (U.V.). I can find no trace of *Bidens cernua* present in any of these.

BIDENS TOWNSENDII Sherff

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eodem loco, September, 1864 (Field; Mo.; Mus. V.); *idem* VIII, 309*c*, eodem loco et tempore (Mus. V.); *A. S. Hitchcock* 735 p.p., wet soil, Atchison Co., Kansas, 1896 (Gray; U.V.); *R. Hoffman*, peat bog, Sandesfield, Massachusetts, July 12, 1907 (N. Eng.; planta minima); *O. A. Hoffstad*, vicinity of Sandefjord, Norway, August, 1893 (Mus. V.); *I. F. Holton*, Kanawha, West Virginia, October 8, 1849 (Field); *Clifton D. Howe* 1464, roadside swamp, Halifax, Nova Scotia, September 1, 1901 (Field); *T. J. Howell*, Sauvies Isl., Oregon, September, 1882 (Field); *O. E. Jennings & G. E. Kinzer*, Ohio Pyle, Pennsylvania, September 10, 1905 (Carn.); *O. E. Jennings & uxor* 5173, swamp pasture, near Fort William, Ontario, September 5, 1913 (Carn.); *iidem & R. H. Daily*, bank of river below Nipigon, Ontario, August 31, 1912 (Carn.); *E. L. Johnston* 394*A*, Brighton, Colorado, September 8, 1908 (N.Y.); *M. E. Jones* 673, alt. 1,500 meters, Platte River, Denver, Colorado, August 22, 1878 (Berl.; forma *B. laevi* adpropinquans); *idem* 4144, Albuquerque, New Mexico, September 4, 1884 (Boiss.; Del.; Field; U.V.); *idem* 5978, alt. 1,800–1,950 meters, Kingston, Utah, September 3, 1894 (Boiss.; N.Y.; U.S.); *T. H. Kearney* 475, near Wasioto, Kentucky, September, 1893 (Boiss.; Gray); *Louis Keller*, ditches at Moosbrun near Vienna, Lower Austria, August 28, 1880 (Mus. V.); *idem*, edges of swamps at Kirschenteuer i. Rosental, Prov. Kärnten (Carinthia), Austria, August, 1907 (Mus. V.); *A. Kellogg & W. G. W. Harford* 437 pro parte, Lake Merced, San Francisco, California, August 22, 1868 (Boiss., Brit., et Kew, quo cum *B. laevi* commixt.; N.Y.; U.S.; type material of *Bidens Kelloggii* Greene); *E. Kindt*, Beckendorf near Boitzenburg (Boizenburg) on the Elbe River, Mecklenburg-Schwerin, Germany, August 28, 1907 (U.V., 2 sheets); *V. Komarov*, eastern shores of Lake Chan-chai, July 20, 1913 (Petrop.; type of *Bidens graveolens* Kom.); *Fr. Körnicke*, Leningrad (Berl.); *Axel Lange*, Surrey, England, September 8, 1895 (Cop.); *O. E. Lansing, Jr.*, 1594, bottom land, Calumet River, Porter, Indiana, September 13, 1902 (Field); *idem* 3981, swampy margins of Calumet River, Clarke, Indiana, September 17, 1915 (Field); *J. B. Leiberg* 689, alt. 1,580 meters, near Fort Klamath, Oregon, August 8, 1894 (Berl.; Calif.; N.Y.); *G. W. Letterman*, near water, vicinity of Denver, Colorado, August 20, 1884 (U.V.); *B. E. Livingston*, vicinity of Grand Rapids, Michigan, July 30, 1890 (Carn.); *J. Lunell* 55, Leeds, North Dakota, August 20–September 3, 1899 (Gray); *Lyall*, Chilliwack Prairie, British Columbia, October, 1859 (Kew); *J. F. Macbride* 297, Falk's Store, Canyon Co., Idaho, June 28, 1910 (Carn.; Del.; Gray);

J. M. Macfarlane, Peak's Isl., Casco Bay, Maine, September, 1913 (Penn., 3 sheets); *J. M. Macoun*, borders of marshes, Muskeg Isl., Lake Winnipeg, Manitoba, August 11, 1884 (Can.; U.S.); *idem*, mouth of Salem River, British Columbia, August 27, 1902 (Gray); *John Macoun*, margins of lakes and marshes, Little Slave Lake, Alberta, September 20, 1872 (Can.); *idem*, margins of streams and lakes, Moira River, Ontario, September 14, 1877 (Can., type of *Bidens prionophylla* Greene); *idem*, swamps and ditches, Brackley Point, Prince Edward Isl., September 5, 1888 (Can.); *idem*, Lulu Isl., mouth of Fraser River, British Columbia, July 27, 1889 (Can.); *idem*, Leamy's Lake, Hull, Quebec, September 6, 1889 (Can.); *idem*, New Westminster, British Columbia, August 28, 1893 (Can.; cf. numeros 457 et 458 infra); *idem*, Brandon, Manitoba, July 29, 1896 (Can.; type of *Bidens leptopoda* Greene); *idem*, by the river, Wakefield, Quebec, August 30, 1903 (Field); *idem*, St. Anne de Beaupré, Quebec, August 30, 1905 (Berl.; Gray); *idem*, Annapolis, Nova Scotia, September 1, 1910 (Can.); *idem*, ditches, Kingsmere, Quebec, August 23, 1911 (Can.); *idem*, Manor Park, Ottawa, August 25, 1911 (Can.); *idem*, Carlsbad Springs, Ontario, September 5, 1911 (Can.); *idem* 457, New Westminster, British Columbia, August 28, 1893 (Can.; Gray; Greene; pro var. *elliptica* Wieg. determinavit K. M. Wiegand; type material of *Bidens Macounii* Greene); *idem* 458, eodem loco et tempore (Can.; Gray); *idem & William Herriott*, Battle River, Alberta, August 15, 1906 (Can.; Field); *iidem*, east of Beaver Hill Lake, Alberta, August 22, 1906 (Can.; Field); *Malbranche* (*Reliq. Mailleanae* 1266), banks of Seine River near Rouen, France, August, 1855 (Cop.; Mus. V.; U.S.); *M. O. Malte*, Salmon Arm, British Columbia, August 13, 1911 (Can.); *E. Martin* 3027, ditch at base of bank of pond at St. Hubert, Commune of Veilleins, Dept. Loir-et-Cher, France, last of September, 1892 (Berl.; Boiss.; Del.; Mus. V.; U.V.); *W. Masarakij* 1074, wet, sandy soil along stream, near Preobrashenskaja, Distr. Luga, Prov. St. Petersburg, August 19, 1906 (Berl.; Cop.; Del., 2 sheets; Mus. V.); *W. C. McCalla* 2514, vicinity of Edmonton, Alberta, September 14, 1918 (Can.); *F. T. McFarland* 161, Lexington, Kentucky, October 11, 1923 (Phila.); *S. E. Meek*, near Henry, Illinois, September 12–16, 1906 (Mus. V., 2 sheets); *Michener & Bioletti*, Lake Merced, San Francisco, California, June 12, 1892 (N.Y.); *C. F. Millspaugh* 14, wet river bank near Lake, Indiana, September 22, 1900 (Field); *M. E. Moricand* (i.e., *Stefano*), vicinity of Vienna (Wien), Austria, (Del.) and Venice (Venetia), Italy, September (Del.); *E. L. Moseley*,

BIDENS AUREA (Ait.) Sherff

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Castalia, Ohio, September 19, 1895 (Field); *John Murdoch, Jr.*, 4307, alt. 1,350 meters, Pactola, South Dakota, August 12, 1910 (Gray); *Aven Nelson* 1707, Centennial Valley, Wyoming, August 17, 1895 (Carn.); *idem* 8657, margins of marshes, Platte Canyon, Laramie Co., Wyoming, September 4, 1901 (Boiss.; Del.); *J. C. Nelson* 4131, Minto's Isl., south of Salem, Oregon, August 13, 1921 (Phila.); *idem* 4796, ditch by roadside, Sauvies Isl., Multnomah Co., Oregon, September 16, 1922 (Phila.; forma ternis foliis ad singulos nodos verticillatis); *J. B. Norton* 282, wet places, Riley Co., Kansas, July 2, 1895 (U.V.); *Thomas Nuttall*, Wappatoo Isl. (Sauvies Isl.; Brit., sub nom. *Bidente quadriaristata* var. *dentata*); *R. Oldham* 411 pro parte, Nagasaki, Japan, 1862 (Del.); *Joseph Paczoski*, Pereiaslaf (Pereiaslaw), Government of Poltava (Poltawa), Little Russia, August 6, 1891 (Boiss.); *L. H. Pammell & R. E. Blackwood* 3932, alt. 1,950 meters, Weber River, Peterson, Utah, July 18–24, 1902 (Gray); *Franz Petrak* (Distrib. I) 95, marshes at Skalitzka near Weisskirchen, Moravia (Mähren), Czechoslovakia, August 26, 1908 (Gray; planta minima); *idem* (Distrib. VII) 692, meadow ditches, vicinity of Weisskirchen, August, 1911 (Gray); *Mairlot Pollem*, ditch, Belgium, September 28, 1901 (Mus. V.); *S. F. Poole* 80, Sharon, Massachusetts, September, 1905 (Gray); *G. N. Potanin*, Taituhai, plain of eastern Ordos region, Mongolia, August 30, 1884 (Berl.; Gray; Mus. V.); *idem*, Lake Orok-nor, Desert of Gobi (Shamo), Mongolia, September 1, 1886 (Gray); *E. Preissmann*, alt. 270 meters, swampy places, Poltschach, southeastern Styria (Steiermark), August 26, 1881 (Mus. V.); *Wolfgang Puchtler* 825, alt. 350 meters, ditches at Neuenmarkt-Wirsberg, Upper Franconia (Ober-Franken), Bavaria, August, 1904 (Del., 2 sheets; Gray); *idem* 1720, alt. 390 meters, ponds, Berneck, Upper Franconia, July 13, 1918 (Del.); *F. Raine*, marsh near Dormans, Surrey, England, September 3, 1905 (Gray); *Regel*, Varposka, Government of St. Petersburg (Berl., 2 sheets; Mus. V., 2 sheets); *Aladár Richter*, Cluj, Prov. Transsilvania, Roumania, September 23, 1901 (Cluj; sub nom. *Bidente cernua* f. *elongata* A. R., planta tenui simplicique); *B. L. Robinson*, boggy meadow after mowing, Hancock, New Hampshire, September 13, 1899 (Gray); *idem* 400, ditches, Jaffrey, New Hampshire, September 11, 1897 (Gray); *Rugel*, French Broad River near Dandridge, Tennessee, September, 1842 (Mus. V.); *P. A. Rydberg* 1696, near Thedford, Nebraska (Cop., 2 sheets); *idem* (similiter) 1696, Middle Loup River, near Mullen, Nebraska, August 17, 1893 (Berl.; N.Y.); *idem* 9646, Moore Lake, Anoka Co., Minnesota, September 5, 1926

(N.Y., 2 sheets; pro *Bidente filamentosa* Rydb.); *idem* 9648, White Bear Lake, Minnesota, September 15, 1926 (N.Y.; numero 9646 aequale et similiter a Rydbergio pro sua *Bidente filamentosa* habitum); *H. Sabransky*, ditches, Ebersdorf, eastern Styria (Steiermark), August, 1908 (Mus. V.); *J. H. Sandberg* 985, Minneapolis, Minnesota, September 23, 1891 (Field; U.S.; type collection of *Bidens gracilenta* Greene); *J. A. Sandman* 386, seashore near Uleaborg, Finland, August 29, 1884 (Berl.; Cop.; Del.; Mo.);[1] *Sandvik*, southwestern Finland, August 6, 1861 (Berl.); *H. E. Sargent* 74, Lake Wentworth, Wolfboro, New Hampshire, September 2, 1909 (Gray); *J. T. Scovell & H. Walton Clark* 1225, beach at Long Point, Lake Maxinkuckee, Indiana, October 30, 1900 (Field); *F. L. Scribner* 108, Dog Creek near Missouri River, Montana, September 11, 1883 (Gray); *A. D. Selby & J. W. T. Duvel* 1261, near Orville, Ohio, September 4, 1899 (Field); *iidem* 1266, Killbuck Swamp, Wayne Co., Ohio, September 15, 1899 (Carn.); *F. C. Seymour* 87, Granville, Massachusetts, September 20, 1913 (Gray); *E. P. Sheldon*, University Park, Oregon, September 14, 1902 (Field); *E. E. Sherff* 2029, along stream, Skokie Marsh, west of Glencoe, Illinois, October 3, 1915 (Field); *idem* 2047, Thorn Creek, northwest of Glenwood, Illinois, October 7, 1915 (Field); *H. G. Simmons*, Augustenhof, Schleswig-Holstein, August 11, 1893 (Cop.); *P. Sintenis* 1832, wet places, Katarina (Katerina), Vilayet of Salonica, European Turkey, September 9, 1889 (Berl.); *J. K. Small*, Pleasant Grove, Pennsylvania, October, 1903 (N.Y.); *idem & A. M. Huger*, Chimney Rock to Hendersonville, North Carolina, October 3, 1901 (N.Y.); *B. H. Smith*, Cherry Creek, Denver, Colorado, August 24, 1884 (Phila.); *W. Spreadborough*, mouth of Salmon River, British Columbia, August 27, 1904 (Can.); *E. S. Steele*, river swamps, vicinity of Washington, District of Columbia, September 18, 1896 (U.V.); *idem & uxor* 219, alt. 550 meters, Sweet Springs, West Virginia, September 5, 1903 (Gray); *Stefano* (vide *Moricand*); *Stoliczka*, vicinity of Islamabad, northwestern Himalaya, British East India (Mus. V.); *Gabriel Strobl*, ditches, at Admont, northwestern Styria, June, 1876 (Mus. V.); *W. N. Suksdorf* 932, wet meadows near Spangle, Washington, July 12, 1889 (Berl.; Boiss.; Del.; Field); *idem* 1592, wet ground, Falcon Valley, Washington, September 20, 1894 (Boiss.; Field); *T. Symonowiczówna* 736, Minojty, Distr. Lida, Lithuania (Berl.; Mus. V.); *B. C. Taylor*, Center City,

[1] Printed label of *Sandman* 386 states: "Forma radiata in Finlandia rara aut rarissima et tantum in litoribus vel in vicinitate maris lecta est. Ad oras Sinus Bottnici nonnullis locis occurrit; rarissime ad oram intimae partis Sinus Finlandensis ad Mare Album crescit. F. typica multo frequentior est; in interioribus etiam partibus Finlandiae australis invenitur."

BIDENS INTEGRIFOLIA Brandeg.

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Minnesota, 1892 (Boiss.); *C. G. H. Thedenius*, Göteborgstrakten, Sweden, August, 1902 (Man.); *T. Thomson*, alt. 1,500–1,800 meters, Kashmir, British East India (Berl.; Boiss.; Cop.; Del.; Gray; Kew, 2 sheets; Mus. V.; aristis interdum tantum 1–8-hamosis); *L. Vágner*, ditches and other wet places, Comitat of Mármaros (Máramaros, Marmaross), Hungary, August–September (Mus. V.); *S. S. Visher* 2224, Sand Creek, Bennett Co., South Dakota, August 12, 1911 (Field); *A. Von Hayek* 796, alt. 635 meters, in grassy places near Selzthal, Styria (Steiermark), Austria, July, 1908 (Berl.; Mus. V.; U.V.); *S. C. Wadmond* 1232, Racine and Kenosha counties, Wisconsin, September 7, 1899 (Phila.); *L. F. Ward*, along the canal, vicinity of Washington, District of Columbia, September 10, 1876 (U.S.; planta ad dextram forma *Bidenti leptomeriae* Greenei aequalis); *idem*, Eastern Branch Marsh, District of Columbia, July 7, 1878 (U.S.; type of *Bidens leptomeria* Greene); *E. Wilson*, Armstrong, British Columbia, 1904 (Can.); *Ferdinand Winter* 345, Saarbrücken, Rhine (Rhein-Provinz), September, 1866 (Berl.); *idem* 751, St. Johann, Saarbrücken, Rhine, September, 1863 (Berl.; hoc et num. 345 et nonnulla alia specimina a Wintero pro hybridis inter *B. cernuam* et *B. tripartitam* habita, sed videntur vere *B. cernua*); *Witasek*, Mitterburg, Istrian Peninsula, Prov. Coastland (Küstenland), August, 1901 (U.V.); *E. Witting*, swamps at Lake Leonhard, near Villach, Prov. Carinthia (Kärnten, Kärnthen; Mus. V.); *Wolfgang*, flooded marshes, Lithuania (Mus. V.); *W. F. Wright* 251, near Ouatchonan Falls, Lake St. John, Quebec, August 29, 1904 (Gray); *R. T. Young*, common in marshes on the plains, near Boulder, Colorado, September 14, 1904 (Field); *A. Zahlbruckner*, ditches at St. Georgen, Kleine Karpaten (Little Carpathian) Mts., northwestern Hungary, September, 1883 (Mus. V.); *N. Zelenetzuy* (*N. Zelenetzkij*), Krima (Crimea) Peninsula, South Russia, July, 1885 (Boiss.); *Alois Zick* 825*a*, alt. about 720 meters, peaty soil, swamp ditches at Wildpoldsried near Kempten, Bezirk of Swabia (Schwaben), Bavaria, September 7, 1913 (Del.; Gray); *Zupančič* 781, marshes near Laibach (Labacus), Prov. Carniola (Krain, Krajina), Jugo-Slavia, August (U.V.).[1]

Linnaeus gave a short description for *Bidens cernua:* "Bidens seminibus erectis: foliis lanceolatis amplexicaulibus, floribus cernuis. Fl. suec. 664." The character *cernua*, taken with the lanceolate leaves and with the habitat cited ("in Europa ad fontes & fossas")

[1] The juice of this species said by Lightfoot (Fl. Scot. 1: 462. 1777) to dye cloth yellow. It also excites salivation (Gandoger, Fl. Lyon. 122. 1875).

leaves not the slightest doubt as to the identity of *B. cernua*. Linnaeus' first cited synonym, Fl. Suec. 664, rests by synonymy upon *Bidens folio non dissecto* Tourn. Inst. 462, which in turn goes back directly to *Bidens folio non dissecto* Caesalp. 16: 488, cap. XVII, published in 1583.

In the Linnean Herbarium are only two specimens of this species. One, in the *Bidens* cover, is marked "2 *cernua*" and the other, in the *Coreopsis* cover, is marked "7 *Bidens*." The latter is clearly the radiate form meant by Linnaeus for his *Coreopsis Bidens;* the former is the discoid form. Linnaeus expressly declared his doubts as to whether the radiate form was a distinct species or only a variety of *B. cernua*, although Valantius held the latter view (L. Fl. Suec. ed. 2: 300. No. 772. 1755).[1]

Numerous attempts have been made in literature to segregate the various forms of *B. cernua* into formae, subvarieties, varieties, and even separate species. The trouble with this work has been that, with the apparent exception of var. *oligodonta* Fern. & St. John, these forms vary so indiscriminately that the "characters" listed for one form will elsewhere reappear in almost endless overlapping combinations with those of other described forms and hence the lines of demarcation disappear (regarding difficulties in such cases, vide H. M. Hall, Proc. Internat. Congr. Pl. Sci. 1926, 2: 1571. 1929). Thus there are plants dark green or pale and subglaucous, tall or dwarf, radiate or discoid, smooth-stemmed or scabrous-stemmed, wide-leaved or narrow-leaved, etc.[2]

[1] So, too, concluded Roth (Tentamen 2, pt. 2: 303. 1793): "omnino mera tantummodo varietas est *Bidentis cernuae*;" also C. F. Schultz (Prodr. Fl. Stargard. 208. 1806): "floribus radiatis in fossis cum praecedente [B. cernua] cujus mera varietas est;" also numerous other students of the subject since then.

[2] A plant has even been found having single leaves (never more than one at a node) pinnate with linear segments (Asch. & Graebn. Fl. N.E. Deutsch. Flachlandes ed. 2: 716. 1898; cf. specimen *Frohockii* citatum supra). A form appeared spontaneously several years ago along the lagoons in Jackson Park, Chicago, Illinois, having the leaves definitely verticillate in threes. A specimen was given to Dr. Henry C. Cowles, who in turn presented it to me. The plant unfortunately was lost in mounting. The same form has been found again in Oregon (*J. C. Nelson* 4796; Phila.).

If varieties other than *oligodonta* are to be maintained for North American material, then the leaf characters appear to offer the most acceptable basis of separation. We should in such case recognize the species proper and the vars. *integra* Wieg., *elliptica* Wieg., and *oligodonta* Fern. & St. John. We may note here that Fernald (Rhodora 24: 206. 1922) presents the results of a study of *B. cernua* in eastern North America in which he treats these (and other) forms. His distributional ranges as given are:

"*B. cernua* (typical) . . . extending northeastward to Chicoutimi, Rimouski and Bonaventure Cos., Quebec, Magdalen Islands and Cape Breton,

Bidens quadriaristata var. *dentata* Nutt. was based upon a small, fragmentary specimen (Brit.) from Wappatoo Island (now called Sauvies Isl.) at the outlet of the Wahlamet (now Willamette) River, northern Oregon. Elsewhere I have published a photograph of it (Bot. Gaz. 59: 313, *fig. 2.* 1915). It might by some be construed as representing *B. laevis* (L.) B.S.P., but *B. laevis* is not known to range nearly so far north in the western United States. Nuttall's variety (as also the nomenclaturally synonymous *B. dentata* Wieg.) should not be confused with the widely different *B. amplissima* Greene.

In 1901, Greene (loc. cit.) described a number of new species of *Bidens*. On examination of his types and cotypes, I was dismayed to find that most of these species represented what ordinarily had been regarded as mere ecological forms of *Bidens cernua* and *B. laevis*. Direct conversation with Dr. Greene himself showed that back of his viewpoint regarding *B. cernua* (Greene, op. cit. 251–253) was the absolute conviction that the American specimens were native to America, and, being so, were hence specifically different from European specimens.[1] Personal field study for several autumns, combined with a careful examination of a vast amount of *B. cernua* material from different parts of the northern hemisphere, has convinced me only the more of the utter impossibility of separating the many forms as species. Scarcely a form occurs in North America that is not duplicated by a similar form in Europe. Even Greene (op. cit. 252) was compelled to declare "after careful and repeated comparisons made between European and American specimens of

> Nova Scotia; Eurasia. In Nova Scotia unknown from west of Annapolis and Lunenburg Cos."
>
> "Var. *integra* . . . Prince Edward Island; Cape Cod, Massachusetts; Illinois to western North Carolina, Oklahoma and South Dakota."
>
> "Var. *elliptica* . . . extending northeastward to the Ottawa Valley, Ontario and Quebec, and Prince Edward Island."

The relevant part of his key (omitting the var. *oligodonta* already treated above) is here Latinized:

Folia basi late connata vel subconnata, infra medium vix angustata

Folia circumambitu a lineari usque ad oblanceolatum, dentata 4–13 jugis dentium grossorum 1–5 mm. altorum . . . . . *B. cernua* sensu stricto.

Folia circumambitu a lineari-oblongo usque ad lanceolato-oblongum, dentulata 12–24 jugis dentium vix 1 mm. altorum . . . . . var. *integra.*

Folia basi perspicue angustata, circumambitu elliptico-lanceolata . . . var. *elliptica.*

[1] In emphasizing his views upon this subject, Dr. Greene exclaimed: "I defy you to find a single species of Compositae that is native both to Europe and to North America." As to the nativity of *B. cernua*, we should note that it was known from Europe much earlier than from North America (cf. DC. Prodr. 5: 594. 1836: "in Europae et nunc in Amer. borealis fossis inundatis et aquaticis frequens")

so-called *B. cernua*, I acknowledge inability to detect any strong technical characters upon which to separate them."[1]

Again, in a single colony of *B. cernua*, frequently three or more dissimilar forms occur, with numerous intergradations. Thus, in a single small colony north of Elgin, Illinois, many plants were diminutive, matching forms doubtless included with the corresponding dwarf forms of *B. tripartita* by Hudson in his *B. minima*;[2] some were tall and robust, matching *B. leptopoda* Greene (the type of which the late Mr. James M. Macoun of the Canadian Geological Survey Herbarium at Ottawa kindly permitted me to examine); and some were small plants grown from the rooting nodes of tall plants trampled by cattle, and were practically identical with *B. marginata* Greene. In the same way, several of Greene's types are found on comparison with their cotypes in other herbaria to be merely slight variants from the standard form. In certain of these cases, Greene's description was much too narrow to fit even the few cotypes examined.

B. leptomeria Greene, founded upon a plant from Eastern Branch Marsh, Washington, District of Columbia (*L. F. Ward*, July 7, 1878; U.S.), is seemingly a more or less teratological form with long peduncles. Several other specimens from the same vicinity (all in Hb. U.S.) connect this extreme perfectly with normal *B. cernua*.

Occasionally specimens are found which represent apparently hybrids with *B. connata*. One such plant is *F. F. Forbes*, swamp on Brookline Water Works Land, Cow Bay, Dedham, Massachusetts, September 21, 1911 (Gray).

Bidens cernua var. *β.* **oligodonta** Fern. & St. John, Rhodora 17: 25. 1915. Pl. LXXII, figs. *b* and *c*.

Herba humilis, plus minusve depressa, ramosissima, 0.5–2 dm. alta; caulibus glabris vel sparse hispidis; foliis crassis, rhomboideis vel elliptico-oblanceolatis, apice obtusis, ad basim angustatis, subintegris vel pauco-dentatis, dentibus utrinque 1–5 obtusis, foliis primariis 2–5 cm. longis et 0.5–1.5 cm. latis; capitulis hemisphaericis

[1] Illustrative of Greene's regrettable carelessness displayed in much of his work on *Bidens* is the case of *B. Kelloggii* (Greene, loc. cit.). In naming certain forms *B. Kelloggii*, he treated them as segregates of *B. laevis* (L.) B.S.P. Then he actually stated that "Dr. Torrey . . . more correctly referred them to *B. cernua*." In passing, we may note that while Greene's type of *B. Kelloggii* (U.S.) is not distinct from *B. cernua*, sheets of the type number (*Kellogg & Harford* 437) in certain herbaria (Boiss.; Brit.; Kew) bear an additional specimen of *B. laevis* (L.) B.S.P. mixed with the *B. cernua*.

[2] See second footnote under synonymy for *B. cernua*.

0.5–1 cm. latis; bracteis foliaceis oblongis vel late oblanceolatis, apice obtusis, plerumque 1.5–2 cm. longis.

Type specimen: Collected by *Merritt L. Fernald, Bayard Long,* and *Harold St. John,* No. 8208, peaty margin of a brackish pond southwest of Etang du Nord wharf, Grindstone Island, Magdalen Islands, Quebec, August 22, 1912 (Gray, 2 sheets).

Distribution: Magdalen Islands, Prince Edward Island, Massachusetts, and "locally inland to western New York" (Fern. Rhodora 24: 207. 1922).

Specimens examined: *Fernald & St. John* 11211, border of a fresh pond back of sandhills, Tracadie, Prince Edward Isl., August 22, 1914 (Gray); *Fernald, Long, & St. John* 8208 (type, Gray: cotype, Field); *iidem* 8209, wet brackish sand, North Lake, Kings Co., Prince Edward Isl., August 22, 1914 (Gray); *A. S. Pease,* sandy shore of Success Pond, Success, New Hampshire, August 27, 1907 (N. Eng.).

Of all the many described varieties, forms, etc., of *B. cernua,* this is the only one which, so far as it is known at present, can easily be maintained with varietal distinction (cf. discussion under species proper).

EXPLANATION OF PLATE LXXII

Bidens cernua, figs. *a, d–k: a,* flowering and fruiting specimen, ×0.61; *d, e,* diverse cauline leaves, ×0.61; *f,* exterior involucral bract, ×3.03; *g,* interior involucral bract, ×3.03; *h,* ray corolla, ×3.03; *i,* palea, ×3.03; *j,* disc floret, ×4.85; *k,* achene, ×4.85; *a, f–j,* from *Greenman* 543, in Hb. Field; *d,* from *Coville* 1341, in Hb. U.S.; *e,* from *A. J. Grout,* Vernon, Vermont, September 13, 1895, in Hb. Field; *k,* from *Sherff* 2047, in Hb. Field.

Bidens cernua var. *oligodonta,* figs. *b, c:* characteristic cauline leaves, ×0.61; from 1st type sheet.

93. **Bidens laevis** (L.) B.S.P. Prelim. Cat. N.Y. 29. 1888. Pl. LXXIII.

Helianthus laevis L. Sp. Pl. 906. 1753.[1]

Coreopsis radiata Mill. Gard. Dict. ed. 8. No. 5. 1768 (ex descript.).

Coreopsis Helianthoides Forst. Fl. Ins. Austr. Prodr. 91. 1786. (Verisimiliter.—Cf. Schz. Bip. Flora 39: 356. 1856.)

Coreopsis perfoliata Walt. Fl. Carol. 215. 1788. (Verisimiliter.)

Bidens Chrysanthemoides Michx. Fl. Bor. Amer. 2: 136. 1803.

[1] As to Pl. Gronov. Fl. Virg. ed. 1 (not ed. 2). 104.

Bidens Helianthoides H.B.K. Nov. Gen. et Sp. 4: 181 (230). 1820.

Coreopsis flammula Banks ex Steud. Nom. ed. 1: 108. 1821 (fide Steud.).

Kerneria Helianthoides (H.B.K.) Cass. Dict. Sci. Nat. 24: 399. 1822.

Bidens quadriaristata DC. Prodr. 5: 595. 1836.

Coreopsis perfoliata Bosc ex DC. loc. cit.

Campylotheca? Helianthoides Endl. Bemerkungen über Die Flora Der Südsee Inseln 168. 1841. (Verisimiliter. Vide *Coreopsis Helianthoides* Forst. supra.)

Bidens Chrysanthemoides vars. α., β., γ., and δ. Torr. & Gray, Fl. N. Amer. 2: 353. 1842.

Coreopsis serrata DC. Prodr. 5: 595. 1836.

Bidens Nashii Small, Bull. Torr. Bot. Club 25: 481. 1898.

Bidens elegans Greene, Pittonia 4: 254. 1901.

Bidens lugens Greene, loc. cit.

Bidens formosa Greene, op. cit. 264; non (Bon.) Schz. Bip.

Bidens Parryi Greene, op. cit. 265.

Bidens expansa Greene, op. cit. 266.

Bidens Persicaefolia Greene, loc. cit.

Bidens Chrysanthemoides var. *Nashii* (Small) Jepson, Fl. W. Middle Calif. 544. 1901.

Bidens speciosa Parish, Zoë 5: 75. 1907–1908; non Gardner in Hooker, Lond. Journ. Bot. 4: 126. 1845.

Bidens levis B.S.P. ex Jepson, Man. Fl. Pl. Calif. 1085. 1925.

Herba nunc annua nunc perennis, erecta vel basi procumbens; caule subtereti, simplici vel sparsim ramoso, glabro, 3–10 dm. alto. Folia sessilia, indivisa, lineari-lanceolata vel lanceolata vel rariter ovato-lanceolata, utrinque angustata vel ad basim interdum lata et connata, apice saepe acuminata, regulariter serrata dentibus saepe tenuibus et fere subulatis, glabrata vel margine saepe sparsim ciliata, 5–15 cm. longa. Capitula plerumque pauca, ligulata, erecta vel demum saepe cernua, ad anthesin 3–7 cm. lata et 8–11 mm. alta. Involucrum basi plerumque hispidum; bracteis exterioribus 6–8, parce foliaceis, lineari-lanceolatis, apice obtusis acutisve, margine subsparsim aciculato-ciliatis, capitulo rarissime lingioribus. Flores ligulati 7 vel 8, aurei, ligula obovato-lanceolati, apice rotundi et saepe minute 2–3-denticulati, 1.5–3 cm. longi. Achaenia anguste cuneata, plana vel 3–4-angulata, angulis retrorsum hamosa, angulis faciebusque interdum tuberculata, apice 2–4-aristata aristis 3–5 mm. longis et retrorsum hamosis, corpore 6–9 mm. longa.

Type specimen: Collected by *John Clayton*, No. 195, in "Virginia" (as bounded in early days; Brit., ex herb. Gronovii).

Distribution: From New Hampshire and Massachusetts southward along the coast to Florida and westward from Florida to California; southward through Mexico; in South America mainly from Colombia to Chile, thence through Argentina to Uruguay and southern Brazil; established in the Hawaiian Islands (Oahu, Molokai, etc.).

Specimens examined: *LeRoy Abrams* 4177, Alviso, Santa Clara, California, September, 1902 (Berl.; Del.; Mus. V.; N.Y.); *Ed. André* 551, alt. 2,600 meters, Facatativá, Colombia, 1875 (Kew; N.Y.); *G. Andrieux* 312, Yotla, near City of Mexico, State of Mexico, May 15 (Del.; Kew, 2 sheets, communic. 1834; Mus. V.); *anon.*, Delaware Co., Pennsylvania (U.S.; type of *Bidens formosa* Greene); *anon.*, fresh-water pools, Honolulu and Wailupe, Oahu, Hawaiian Isls. (Bish.); *anon.*, ex Biltmore Herb. No. 138*b* p.p., swampy places, Highlands, North Carolina, September 7, 1897 (U.V.); *J. Arechavaleta*, in flooded places along banks of Santa Lucía River, La Barra, Uruguay, April, 1869 (Berl.); *idem* 4021, Montevideo, Uruguay, February, 1876 (Kew); *Alwin Aschenborn* 478, Mexico (Berl.); *Bacle* 102, Buenos Aires, Argentina, 1831 (Del.); *C. F. Baker* 1697, Alviso, California, September 16, 1902 (Berl.; Boiss.; Can.; Del.; Gray; Mo.; Mus. V., 2 sheets; U.S.); *idem* 3727, Pomona, California, October 1, 1903 (Can.; Del.; Gray; Kew; Mo.); *C. F. Batchelder*, Merrimack, New Hampshire, August 26, 1919 (Phila.); *F. W. Beechey*, California (Kew); *Berlandier* 606, about City of Mexico, State of Mexico, August, etc. (Berl.; Del., 2 sheets; Mo.; Mus. V.); *Bertero*, ditches, marshy places, near Angostura, Chile, February, 1829 (Del.); *idem* 97, about Lake Amleo, Chile, March, 1828 (Del.); *C. Bettfreund* 193 and 199, Buenos Aires, Argentina (Berl.); *A. E. Blewitt* 1146, wet meadow, New Haven, Connecticut, September 17, 1910 (N. Eng.); *H. N. Bolander* 2405, swamp, San Francisco, California, 1863 (Gray; U.S.); *J. Boll*, Dallas, Texas (Del.); *Bosc*, Carolina (Del., sub nom. *Coreopside perfoliata*); *E. Bourgeau* 147, Mexico, May 17, 1865–1866 (Kew); *idem* 510, Mexicalcingo and Canal near City of Mexico, State of Mexico, July 17, 1865 (Berl.; Cop.; Del.; Gray; Kew, 2 sheets; N. Eng.; Par., 4 sheets); *Ernest Braunton* 132, Cienaga Swamp, Los Angeles Co., California, August, 1902 (U.S.); *idem* 576, Los Angeles River, Los Angeles Co., California, July, 1902 (U.S.); *idem* 665, wet places, usually in water, eodem loco, September, 1902 (U.S.); *idem* 728, Oak Knoll, Los Angeles Co., California, October, 1902 (Calif.; U.S.); *Brenning*, Buenos Aires, Argentina,

January, 1894 (Berl.); *W. H. Brewer* 91, Los Angeles, California, 1860–1862 (Calif.; Gray; U.S.); *Bridges* 67, marshes, Quillota, Chile, 1832 (Kew); *J. B. Brinton*, banks of Schuylkill River, southeastern Pennsylvania, August 29, 1879 (Penn.); *idem*, Woodbury, New Jersey, September 21, 1879 (Phila.); *idem*, Holly Oak, Delaware, August 19, 1888 (N.Y.); *idem*, eodem loco, July 14, 1889 (U.V., 2 sheets); *idem*, Rock Hill, Pennsylvania, September 15, 1889 (Penn.); *idem*, Holly Oak, Delaware, September 29, 1889 (Phila.); *idem*, Centre Square, Pennsylvania, September 17, 1891 (N.Y.; Penn.); *idem*, Tylersport near Sellersville, Pennsylvania, September 18, 1892 (Penn.); *N. L. Britton* 424, bank of Miami River, Florida, April 3, 1904 (N.Y.); *E. S. Burgess*, District of Columbia, September, 1888 (N.Y.); ex *herb. Burmannii* (Del., sub nom. *Coreopside perfoliata*); *A. L. Cabrera* 168, Ensenada, near La Plata, Argentina, February 9, 1928 (Field); *L. T. Chamberlain*, Danvers, Massachusetts, August (N.Y.); *Agnes Chase* 2665, muddy edge of slough, Four Mile Run, Alexandria County, Virginia, September 21, 1904 (Field); John Clayton (num. 195 ex Gronovio loc. cit.), "Virginia" (Brit., ex *herb.* Gronovii; type); *Chloris Platensis Argentina* 1177, Argentina (N.Y.); *G. W. Clinton*, Cayuga marshes, New York, 1864 (Gray); *J. W. Congdon*, South Kingston, Rhode Island, September 7, 1878 (Carn.); *C. Conzatti* 124, alt. 1,550 meters, Valley of Oaxaca, State of Oaxaca, Mexico, April 19, 1896 (Gray); *Cruckshank*, Chile (Kew); *J. B. Davy* 2918, Bakersfield, California, October, 1896 (Calif.); *Walter Deane & E. L. Rand*, Swansea (Touisset), Massachusetts, September 25, 1909 (Gray); *Miss Dutton*, Boston, Massachusetts, 1827 (Del.; type of *Bidens quadriaristata* DC.); *E. H. Eames* 1, edge of pond, Bridgeport, Connecticut, September 27, 1897 (Gray); *A. A. Eaton* 159, shore of river and hammock back of Miami, Florida, November 8, 1903 (Field); *Carl Ehrenberg* 38, Mexico (Berl.); *idem* 1496, in marshes near City of Mexico, State of Mexico (Berl.; U.S.); *A. D. E. Elmer* 4209, Alviso, California, September, 1902 (Berl.; Del.; Mus. V.; N.Y.); *A. Fendler* 439, New Mexico (Brit.); *Fernald, Hunnewell, & Long* 10689, Wenham, Massachusetts, September 11, 1913 (Phila.); *C. N. Forbes* 534*Mo*, Wailau Valley, Molokai, Hawaiian Isls., September, 1912 (Bish.); *Fox* 149, Buenos Aires, Argentina (Kew); *Fraser*, South Carolina (Del.); *Gay*, Chile (Berl.; Boiss.; Gray; Kew); *Gibert* 908, in flooded places along banks of the Santa Lucía River, Uruguay, April, 1869 (Kew); *G. B. Grant* 4553, rich, wet woods and plains, September, 1901 (N.Y.); *E. L. Greene*, Marshall Hall, Maryland, September 28, 1898 (Greene; type of *Bidens lugens*

BIDENS AMPHICARPA Sherff (figs. *a–i*)
BIDENS OLIGOCARPA Sherff (figs. *j–l*)

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Greene); *Josiah Gregg* 604, Mexico, 1848–1849 (Gray); *C. A. Gross*, May's Landing, New Jersey, September 12, 1882 (Carn.); *G. Guttenberg*, near Wheeling, West Virginia, September 7, 1878 (Carn.); *Ludwig Hahn* 9, Mexico, 1870 (Berl.); *Hale* 403, southeastern United States (N.Y.); *G. R. Hall*, canal banks at Riverside, California, 1905 (Phila.); *J. W. Harshberger* 102, on chinampas, Lake Xochimilco, Valley of Mexico, August 15, 1896 (Penn.); *C. V. Hartman* 95, alt. 1,530 meters, Cochuto, Sonora, Mexico, October 4, 1890 (Kew; Penn.); *E. Hassler* 1474, vicinity of Lake Ypacaray, Paraguay, November, 1885–1895 (Boiss.; Kew; Hassl.); *idem* 12378, eodem loco, November, 1913 (Berl.; Brit.; Cop.; Del.; Hassl.; Mo.); *Hexamer & Maier*, Hudson Co., New Jersey, September 28, 1854 (Gray); *G. Hieronymus* 490, Lake of Peitiado at Córdoba, Argentina, April, 1877 (Berl.; U.S.); *William Hillebrand*, Kapalama near Honolulu, Oahu, Hawaiian Isls. (Berl.); *idem*, Waikiki near Honolulu, Oahu (Berl.); *idem* 1998, Hawaiian Isls. (U.S.); *P. A. Hollermayer* 102, growing even in salt water, shore of Lake Budi, Prov. Cautín, Chile, March 15, 1919 (Berl.); *Theo. Holm*, river bottom back of Marshall Hall, Maryland, September 28, 1898 (Gray; type material of *Bidens lugens* Greene); *E. S. Hoar*, shallow water, Concord River, Concord, Massachusetts, September, 1858 (N. Eng.); *Humboldt & Bonpland*, Mexico (Par.; type of *Bidens Helianthoides* H.B.K.); *Pedro Jörgensen* 2725, El Chaco Terr., Argentina (Mo.); *T. H. Kearney, Jr.*, 2391, near Northwest, Virginia, November 8, 1898 (U.S.; type of *Bidens elegans* Greene); *Ida A. Keller*, Argus, Pennsylvania, September 18, 1892 (Phila., 2 sheets); *Kellogg & Harford* 437 pro parte, California (Boiss.; Brit.; Kew; cum *B. cernua* commixt.); *C. H. Knowlton*, swamp, Hyde Park, Massachusetts, September 19, 1908 (Gray); *A. F. K. Krout*, Lehigh Co., Pennsylvania, 1868 (Phila.); *F. Kurtz* 9061, Toma de Malpaso, Córdoba, Argentina, March 29 (N.Y.); *F. E. Leibold* 3089, Chile, 1868–1871 (Mus. V.); *F. Lindheimer* III.435, banks of streams, New Braunfels, Texas, 1846 (Berl., 2 sheets; Gray; Kew, 2 sheets); *idem* 887, Texas, October, 1850 (Berl.; Brit.; Cop.; Gray; Kew; Mus. V.; Phila.); *C. D. Lippencott*, Swedesboro, New Jersey, September 18, 1892 (Phila.); *Bayard Long* 4526, Fish House, Camden Co., New Jersey, August 17, 1910 (Phila.); *idem* 4840, Delair, New Jersey, September 2, 1910 (Phila.); *Alexander MacElwee* 1545, Rockhill, Pennsylvania, October 11, 1899 (Carn.); *Alexander MacElwee, Jr.*, Delaware River, at Washington Park, New Jersey, September 27, 1894 (Phila.); *J. M. Macfarlane*, North Wildwood, New Jersey, September, 1907

(Penn.); *K. K. Mackenzie* 3791, swamps, Little Falls, New Jersey, August 30, 1908 (U.S.); *W. L. McAtee* 1709, St. Vincent Isl., Florida, October 30, 1910 (U.S.); *A. J. McClatchie*, San Gabriel River bottom, vicinity of Whittier, California, June 27, 1892 (N.Y.); *Mentzel*, Texas, July (Mus. V., 3 sheets); *André Michaux*, North America (type material of *Bidens Chrysanthemoides* Michx.; Berl., ex Kunthio ex A. Ricardo; Par., 2 sheets; Willd., ex A. Ricardo); *G. V. Nash* 2336, Tallahassee, Florida, August 7–9, 1895 (type material of *Bidens Nashii* Small; Berl.; Gray; Kew; Mo.; U.V.); *C. Osten* 6128, Carrasco, Dept. Montevideo, Uruguay, April 6, 1912 (Field); *Edward Palmer* 18, Sonora, Mexico, 1869 (Gray; U.S.); *idem* 239, Guadalajara, Jalisco, Mexico, July, 1886 (Boiss.; Gray; Kew); *idem* 291, along watercourses, vicinity of Durango, State of Durango, Mexico, June, 1896 (Berl.; Boiss.; Gray; Kew; Mo., 2 sheets); *idem* 633, Uvalde, southwestern Texas, 1879–1880 (Kew; U.S.); *idem* 1843, Tepic, Nayarit, Mexico, January 5–February 6, 1892 (N. Eng.); *S. B. Parish*, stream banks, San Bernardino, California, October, 1893 (U.S.; type of *Bidens expansa* Greene); *idem* 183, in running water, San Bernardino, California, August, 1881 (Boiss.; Calif.; Mun.); *idem* (similiter) 183, borders of streams, San Bernardino Valley, California, September, 1882 (Berl.; Kiel; U.V.); *idem* 4598, alt. 300 meters, San Bernardino, California, November 3–5, 1899 (Phila.; U.S.); *idem* 5134, vicinity of San Bernardino, California, November 5, 1901 (N.Y.); *idem* 5319, alt. 300–750 meters, eodem loco, October 11, 1903 (Field); *Parry, Bigelow, Wright, & Schott* (*Mexican Boundary Survey*) 580, Valley of Rio Grande below Dona Ana, New Mexico (U.S.; type of *Bidens Parryi* Greene); *R. A. Philippi*, Prov. Concepción, Chile, 1862 (Boiss.; Del.); *Eduard Poeppig*, marshes, Cove Creek, Pennsylvania, September, 1824 (Mus. V., 7 sheets); *H. W. Pretz* 11536, Trexlertown, Pennsylvania, September 3, 1922 (Phila.); *C. G. Pringle* 7368, swamps, Guadalajara, Jalisco, Mexico, October 16, 1895 (Berl.); *Jules Remy* 258 *bis*, Hawaiian Isls., 1851–1855 (Gray; Par.);[1] *J. Reverchon*, marsh, Dallas, Texas, September, 1876 (Boiss.); *idem* 518 and 518*a*, common, eodem loco, September, 1884 (N.Y.); *idem* 3355, Dallas, Texas, October 17, 1902 (Gray; U.S.); *idem* 3355*a*, eodem loco et tempore (Mo.); *Rose & Fitch* 17964, vicinity of Devil's River, Texas, October 16, 1913 (U.S.); *Rugel*, marshes near Portsmouth, Virginia, August, 1840 (Berl.); *Schaffner* 233 and 253, near Chapultepec, Mexico, September, 1855 (Berl., 2 sheets; Cop.; Gray; Mus. V.); *Alb. Schmitz*,

[1] *Edelstan Jardin* 32, Oahu, was collected about the same years and was determined as this species by Schultz Bipontinus (Flora 1856: 356. 1856).

BIDENS OLIGANTHA Brandeg. (figs. *a–h*)
BIDENS ANTHRISCOIDES DC. (figs. *i–q*)

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Valley of Mexico, State of Mexico (Mus. V.); *Schnyder* 913, Buenos Aires, Argentina (Berl.); *A. Schott*, Arroyo San Felipe, western Texas (Field); *F. L. Scribner*, Girard Point, Pennsylvania, August 30, 1880 (Penn.); *Eduard & Caecilie Seler* 1277, Lake of Pátzcuaro, Michoacán, Mexico, November 1, 1895 (Berl., 2 sheets; Kew; N.Y.); *Seler* 66, Buenos Aires, Argentina, May 13, 1910 (Berl.); *G. H. Shull* 380, in salt marsh, east shore of Bush River near mouth, Maryland, September 16, 1902 (U.S.); *idem* 398½, entrance to bog near Havre de Grace, Maryland, September 20, 1902 (U.S.); *J. K. Small*, Dillerville Swamp, Lancaster, Pennsylvania, October, 1888 (Mo.); *idem & J. J. Carter* 957, the Everglades, back of Miami, Florida, November 17, 1903 (N.Y.; Phila.); *iidem* 1459, Miami, Florida, October 28–November 28, 1903 (N.Y.); *Small & Nash*, the Everglades, west of Miami, Florida, November 1–9, 1901 (N.Y.); *J. K. & G. K. Small* 4254 and 4324, east shore of Lake Okeechobee, etc., Florida, November 11–25, 1913 (N.Y.); *iidem* 4424, beyond head of New River, Florida, eodem tempore (N.Y.); *iidem* 4482, near Miami Canal, Florida, November 26–December 20, 1913 (N.Y.); *A. H. Smith*, Tinicum, Pennsylvania, September, 1866 (Penn.); *idem*, Delaware River, September, 1870 (Penn.); *Uselma C. Smith* 657, Cape May, New Jersey, October 8, 1892 (Phila.); *E. S. Steele*, vicinity of Washington, District of Columbia, September 25, 1896 (Del.); *Styles*, Chile (Phila.); *C. W. Swan*, Acton, Massachusetts, September 6, 1884 (Can.); *J. R. Swinerton*, Newport News, Virginia, October, 1889 (Mun.); *G. Thurber* 794, margin of Ojo Caliente, Chihuahua, Mexico, October (Gray); *J. W. Toumey* 680, Bradshaw Mts., Arizona, June 23, 1892 (U.S.; type of *Bidens Persicaefolia* Greene); *Mrs. J. A. Tracey* 77, flowering twice a year, alt. 2,580 meters, savanna dykes and streams, Bogotá, Colombia (Kew); *J. J. Triana* 1377, alt. 2,660 meters, marshes, Prov. Bogotá, Colombia (Berl.; Par.); *Uhde* 454, Mexico (Berl.); *idem* 648, eodem loco (Berl., 2 sheets); *E. Ule* 1589, in swamps of the delta of the Rio Tubarão, Santa Catharina, Brazil, April, 1890 (Berl.; Gray); *E. G. Vanatta*, Chestertown, Maryland, August 4, 1902 (Phila.); *B. H. Patterson*, Kissimmee, Florida, December 7, 1917 (Carn.); *L. F. Ward*, vicinity of Denver, Colorado, August 19, 1881 (U.S.); *E. F. Williams*, Rowley, Massachusetts, September 3, 1906 (Gray); *C. S. Williamson*, San Bernardino, California, June, 1903 (Phila.); *G. W. Woolson*, Lodi, New Jersey, September, 1872 (U.V.); *Charles Wright* 347, western Texas, October, 1849 (Gray); *E. C. Wurzlow*, wet soil, bank of Barataria Canal, Louisiana, October 22, 1912 (N.Y.).

The types of *Bidens Chrysanthemoides* Michx. and *B. Helianthoides* H.B.K. appear precisely the same. The original description of both species shows their achenes to have been 2-aristate in each case, although many specimens have since been gathered with the achenes often 3- or 4-aristate. Indeed, one of Michaux's duplicates, sent by Richard to Willdenow (Willd.) has 4-aristate achenes and another, sent by Richard to Kunth (Berl.), has both 3- and 4-aristate achenes. A study of numerous specimens from the United States and Mexico seems to indicate a slight tendency for the western specimens to be more often 2-aristate, the eastern ones more often 3- or 4-aristate, but the variations are so abundant as to defy all attempts at delimiting the separate forms or races in a specific way (cf. Torr. & Gray, Fl. N. Amer. 2: 353. 1842).

Small's *B. Nashii*, founded on southeastern United States material (Florida to Louisiana), is the form originally treated by Torrey and Gray (loc. cit.) as *B. Chrysanthemoides* var. β. Gray (Syn. Fl. N. Amer. 1, pt. 2: 296. 1884) later abandoned the var. β. as well as Torrey and Gray's three other varieties. Jepson (loc. cit.) has reduced *B. Nashii* to varietal rank under *B. Chrysanthemoides*. An examination of a large number of specimens shows that at most it is only a minor form of *B. laevis* and is much too inconstant to merit varietal rank. It is not a variation confined to the southeastern United States but occurs as far west as California and at least as far north as Massachusetts.

Greene cites a single sheet for *Bidens formosa*, a plant from Delaware County, Pennsylvania, but in Field Museum are 5 sheets of material (all by *J. K. Small*, Wetzel's Swamp, N. Harrisburg, September, 1887) from the same state, and these show all gradations between *B. formosa* and *B. laevis*. Again, Greene terms his *B. Parryi* an unwelcome species, "as uniting the habit of *B. cernua* and the fruit of the *Platycarpaea* group of species." But even if *B. Parryi* were a valid species, it would not be the first species to do this; for all the material of *B. laevis* that has flat, biaristate achenes does the same; and, moreover, *B. radiata* Thuill. (*B. platycephala* Oerst.) had long been noted as a species that likewise united *B. cernua* with *B. tripartita*, the latter a principal species of the *Platycarpaea* group (cf. G. Schweinfurth, Verh. Bot. Verein. Brand. 2: 145. 1861). Indeed, Greene on another occasion (op. cit. 261) had been led to consider *B. radiata* in this same connection, having suspected his *B. leptopoda* of being that species. DeCandolle, in monographing the genus *Bidens* (Prodr. 5: 594. 1836), defined the subgeneric section

BIDENS ANTHEMOIDES (DC.) Sherff (figs. *a–j*)
BIDENS ANDREI Sherff (figs. *k–s*)

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Platycarpaea with the evident purpose of admitting just such species as *B. cernua*, and actually classed *B. cernua* among the *Platycarpaea*.

Both *B. Parryi* Greene (from Texas) and *B. Persicaefolia* Greene (from Arizona) are of the form more common in Mexico and often referred by authors to *B. Helianthoides* H.B.K. *B. expansa* Greene is the same form described by Parish for his *B. speciosa* and is similar to the *B. Nashii* forms. *B. elegans* Greene and *B. lugens* Greene both were mistakenly associated by Greene with *B. cernua* L. and then segregated as being worthy species. A study of their types (U.S.) shows them to be unmistakably mere forms of *B. laevis*.

EXPLANATION OF PLATE LXXIII

Bidens laevis: a, flowering specimen, ×0.62; *b, c, d*, diverse cauline leaves, ×0.62; *e*, exterior involucral bract, ×2.47; *f*, interior involucral bract, ×2.47; *g*, ray corolla, ×1.24; *h*, palea, ×2.47; *i*, disc floret, ×4.94; *j*, achene, ×2.47; *a, e–i*, from *E. F. Williams*, Rawley, Massachusetts, September 3, 1906, in Hb. Gray; *b*, from *Palmer* 239, ibid.; *c*, *Bourgeau* 510, ibid.; *d*, from *J. Hale* (a specimen cited for *Bidens Nashii* Small), in Hb. N.Y.; *j*, from *Agnes Chase* 2665, in Hb. Field.

94. **Bidens hyperborea** Greene, Pittonia 4: 257. 1901.
Pl. LXXIV, figs. *b, d, f, h, j, l.*

Bidens colpophila Fern. & St. John, Rhodora 17: 21. 1915.

Bidens hyperborea var. *colpophila* (Fern. & St. John) Fern. ibid. 20: 149. 1918.

Bidens hyperborea var. *typica* Fassett, ibid. 27: 167. 1925.

a. Achaenia exteriora corpore 4.2–5 mm. interiora usque ad 7 mm. longa, aristis marginalibus 1.8–3 mm. longis.
B. hyperborea sensu stricto.

a. Achaenia exteriora corpore 6–8.5 mm. interiora 7.5–10 mm. longa, aristis marginalibus 3–5 mm. longis.

b. Rami adscendentes, cauli angulum minus quam 45° facientes.

c. Involucri bracteae exteriores saepius lineares, acutae, raro latitudine 2 mm. excedentes; foliis anguste lanceolatis, longo-attenuatis, dentatis 2–8 jugis dentium gracilium basi raro quam 0.5 mm. latiorum . . . . . var. *β. cathancensis.*

c. Involucri bracteae exteriores lanceolatae vel raro lineares, saepe obtusae, latitudine 2 mm. excedentes; foliis lanceolatis, non valde attenuatis, dentatis 1–5 jugis dentium grossorum basi saltem 1 mm. latorum . . . . . var. *δ. laurentiana.*

b. Rami mediani inferioresque patentes, cauli angulum plus quam 45° facientes.

c. Folia principalia integra vel usque ad 3 jugis dentium dentata.

d. Folia membranacea, dentata (1 vel) 2 vel 3 jugis dentium; involucri bracteis exterioribus utrinque 1- (raro 2-) dentatis; interioribus late oblongis, 3–4 mm. latis.
var. ε. *Svensonii.*

d. Folia interdum parce membranacea, integra vel dentata 1–2 jugis dentium; involucri bracteis exterioribus integris vel raro utrinque 1-dentatis; interioribus anguste oblongis, 2–3 mm. latis.....var. ζ. *gaspensis.*

c. Folia principalia dentata 4–6 jugis dentium..var. γ. *arcuans.*

Herba annua, erecta, simplex vel ramosa ramis arte adscendentibus, 1–7 dm. alta, caule glaberrimo vel etiam scabrido-hispido. Folia membranacea, oblanceolato-acuminata, glaberrima et non ciliata; ima subpetiolata; media superioraque sessilia, 0.3–1 dm. longa et 6–13 mm. lata, normaliter remote serrata dentibus utrinque 3–10. Capitula plerumque erecta, pedunculata pedunculis 1–6 cm. longis, discoidea vel radiata, demum (bracteis exterioribus non inclusis) 1–2 cm. lata et 1.1–1.3 cm. alta. Involucrum cylindrico-campanulatum vel turbinato-hemisphaericum; bracteis exterioribus 4–8, foliaceis, arte adscendentibus, glabris, remotissime ciliatis, lineari-lanceolatis, acutis vel subacutis, 1.5–4 cm. longis; interioribus oblongis, subacutis, membranaceissimis, flavis, badio-striatis. Flores ligulati (si praesentes) plerumque 5, interdum 6 vel 7, sulphurei, valde membranacei, ligula anguste oblongo-ovati, apice 2–4-dentati, bracteas interiores dimidio superantia; tubulosi nunc 4- nunc 5-lobati. Achaenia anguste cuneata, plana vel subplana, subnigra, marginibus nervisque retrorsum hamosa, 2- vel saepe 3–4-aristata, aristis retrorsum hamosis; exteriora corpore 4.2–5 mm. interiora corpore usque ad 7 mm. longa, omnia circ. 1–1.3 mm. lata, aristis marginalibus 1.8–3 mm. longis.

Type specimen: Collected by *James Melville Macoun,* in swamps and ditches, Rupert House, James Bay, Quebec, September 5, 1885 (Can.).

Distribution: Massachusetts northward to New Brunswick and Nova Scotia.[1]

Specimens examined: *C. H. Bissell,* river bank, Brunswick, Maine, Aug. 13, 1911 (N. Eng.); *A. A. Eaton & M. L. Fernald,* brackish

[1] Specimens by *V. Jacquemont,* subsaline marshes, Hackensack, New Jersey, July 23, 1827 (Berl.; Par.), belong to this species, perhaps to one of its varieties.

BIDENS CHRYSANTHEMIFOLIA (H.B.K.) Sherff

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shore, Newburyport, Mass., Oct. 2, 1902 (Gray); *N. C. Fassett* 139, shores, submersed at high tide, Abagadassett Point, Kennebec River, Bowdoinham, Maine, August 16, 1921 (N. Eng.); *idem* 292, tidal flats of Sheepscot River, Alna, Maine, August 14, 1922 (Gray; N. Eng.); *idem* 787, tidal mud of Mill River, near Newburyport Turnpike, Rowley, Massachusetts, September 22, 1923 (Gray); *idem* 794, tidal shores of Salmon Falls River, Salmon Falls, New Hampshire, September 22, 1923 (Gray); *idem* 880, stony shore, tidal flats of Kennebec River, Gardiner, Maine, September 18, 1923 (Gray); *idem* 884, stony beach, tidal shores of Kennebec River, Gardiner, September 18, 1923 (Gray); *idem* 895, tidal shores of Mousan River, Kennebunk, Maine, September 22, 1923 (Gray); *idem* 2102, tidal mud flats of Pleasant River, Columbia Falls, Maine, August 30, 1924 (Gray); *idem* 2103, tidal mud flats of River Philip, Oxford, Nova Scotia, August 24, 1924 (Gray); *idem* 2104, small brook flowing into Shediac River, Shediac, New Brunswick, August 23, 1924 (Gray); *idem* 2106, tidal shores of Kennebec River, West Woolwich, Maine, September 8, 1924 (Gray); *idem* 2107, tidal shores, Pleasant River, Columbia Falls, Maine, August 17, 1924 (Gray); *idem* 2108, eodem loco, August 30, 1924 (Gray); *idem* 2109, estuary of Harrington River, Harrington, Maine, August 17, 1924 (Field; Gray); *idem* 2111, tidal shores, Union River, Ellsworth, Maine, August 17, 1924 (Gray); *idem* 2112, eodem loco et tempore (Gray); *idem* 2113, tidal shores, Mill River, Rowley, Massachusetts, August 15, 1924 (Gray); *idem* 2114, tidal shores of Mousan River, Kennebunk, Maine, September 22, 1923 (Gray); *idem* 2115, estuary of Shediac River, Shediac, New Brunswick, August 22, 1924 (Field; Gray); *idem* 2126, tidal shores of Kennebec River, South Gardiner, Maine, September 16, 1924 (Gray); *idem* 2129, tidal shores of Kennebec River, Richmond Camp Ground, Sagadahoc Co., Maine, September 16, 1924 (Gray); *idem* 2131, tidal shores of Cherryfield River, Cherryfield, Maine, August 17, 1924 (Gray); *M. L. Fernald* 2248, salt marsh, Winnegance Creek, Phippsburg, Maine, August 23, 1909 (Gray; N. Eng.); *idem* 2249, among sedges and rushes, eodem loco et tempore (N. Eng.; type of *Bidens colpophila* Fern. & St. John); *idem & Bayard Long* 296, very abundant on muddy and gravelly tidal flats, Penobscot River, Hampden, Maine, September 8, 1916 (Berl.; Can.; Carn.; Cop.; Del.; Gray; Kew; Mun.; N. Eng.; Par.; Phila.); *iidem* 14826, border of salt marsh, Back River Creek, Woolwich, Maine, Sept. 15, 1916 (N. Eng.; Phila.); *iidem* 14829, tidal flats of Penobscot

River, Bangor, Maine, September 7, 1916 (Field; Gray; Kew; N. Eng.); *iidem* 14830, eodem loco et tempore (Field; Gray; N. Eng.; forma capitulis radiatis quam forma discoidea sub num. 14829 lecta rarior); *iidem* 14831, tidal mud flats at mouth of Reed Brook, Hampden, Maine, September 8, 1916 (Field; Gray; N. Eng.); *iidem* 14832, tidal mud flats, mouth of Reed Brook, Hampden, Maine, September 8, 1916 (Gray; N. Eng.; Phila.); *iidem* 14833, tidal mud flats at mouth of Souadabscook Stream, Hampden, Maine, September 11, 1916 (Gray; Phila.); *iidem* 14834, eodem loco et tempore (Gray; N. Eng.; Phila.); *M. L. Fernald & H. K. Svenson* 1100, tidal mud, North River, Hanover, Massachusetts, October 6, 1928 (Gray); *Kate Furbish*, Cow Isl., Topsham, Maine, August, 1910 (N. Eng.); *J. M. Macoun*, Rupert House, James Bay, etc. (type, Can.); *Marie-Victorin* 15458, shores, in the intercoastal zone, Saint-François de l'Ile d'Orleans, Quebec, August 24, 1922 (Gray); *A. H. Norton*, Nonesuch River, Scarborough, Maine, August 20, 1919 (Gray; N. Eng.); *idem & Everett Smith*, Abagadassett Point, Bowdoinham, Maine, September 28–30, 1919 (Deam); *H. K. Svenson & N. C. Fassett* 797, muddy tidal shores of Pleasant River, Columbia Falls, Maine, August 28, 1923 (Gray); *iidem* 847, eodem loco et tempore (Gray); *iidem* 848, tidal shores of Union River, Ellsworth, Maine, August 29, 1923 (Gray); *iidem* 878, tidal shores of Narraguagus River, Cherryfield, Maine, August 28, 1923 (Gray); *iidem* 879, tidal mud of Buctouche River, Coate Mills, New Brunswick, August 20, 1923 (Gray); *R. A. Ware* 4230, bank of Androscoggin River, Brunswick, Maine, August 22, 1911 (N. Eng.).

On examination in 1916 of the cited specimens (Gray) of *Bidens colpophila*, I made a careful study of them in the light of my drawings, photographs, and notes taken the previous year from the three small type plants (Can.) of *B. hyperborea*. My conclusion was that they were conspecific. Later, Professor Fernald, who with Dr. H. St. John had described *B. colpophila*, turned his attention again to that species, reducing it to varietal rank under *B. hyperborea*. He recognized also two other varieties of *B. hyperborea*, vars. *cathancensis* and *gaspensis*. He gave (Rhodora 20: 146–150. 1918) an extended discussion of *B. hyperborea* and these three varieties, with an analytical key for their determination. The vars. *cathancensis* and *gaspensis* are here retained. Var. *cathancensis* is marked by its elongate, much toothed leaves and in habit often approaches *B. Bidentoides;* var. *gaspensis* by its tendency toward being depressed or matted[1] and

[1] The plant chosen for my plate did not have this depressed or matted habit so pronounced.

BIDENS MOLLIFOLIA Sherff

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toward being much more highly branched for its size, the branches usually being arcuate. Both varieties differ from the species proper in having much larger achenes. The species proper has the "outer achenes 4.2–5 mm. long; the inner 6–7 mm. long, with marginal awns 1.8–3 mm. long"; the two varieties each have the "outer achenes 6–8.5 mm. long; the inner 7.5–10 mm. long, with marginal awns 3–5 mm. long" (Fern. op. cit. 149).

In 1925, Fassett presented the results of further studies of *B. hyperborea* and its varieties (Rhodora 27: 166–171). He followed Fernald in retaining the var. *colpophila*, which he distinguished from his (i.e., Fassett's) var. *typica* of *B. hyperborea* as follows:

"Plant simple and monocephalous: leaves oblanceolate and blunt, entire or obscurely toothed.....var. *typica*.
Stem somewhat branching: leaves serrate.....var. *colpophila*."

When sheets of smaller specimens (e.g., *Fassett* 884) are studied, practically all distinctions indicated in Fassett's key are obliterated. The numerous specimens collected in recent years and labeled var. *colpophila* appear to be merely what one would expect as to the normal vegetative growth forms of *B. hyperborea* proper (i.e., var. *typica* Fass.).[1] Apparently, considerations of geographic isolation were relied upon by Fernald and later by Fassett. When the so-called *colpophila* form was known, as it at first was, only from Maine, these geographic considerations were of somewhat more force than now, when admittedly (and so listed by Fassett, loc. cit.) *colpophila* material has been collected as far north as New Brunswick and at least as far south as Massachusetts.

Fassett (Rhodora 27: 171. 1925) has described an apparent hybrid between this species and *B. cernua* L., having "the habit of *B. hyperborea*, and the achenes of *B. cernua*."[2]

[1] The three slender, unbranched type plants of *B. hyperborea* have some of the leaves missing, but several leaves still remain (one plant has four) and these approach very closely the leaves on certain small, undersized specimens of the var. *colpophila*. A study of Fernald's analytical key (op. cit. 149) shows that he, as well as myself, failed to find any achenial distinctions for his var. *colpophila*. His vegetative distinctions there given would seem to connote, as do those given later by Fassett, merely different degrees of vegetative growth. Thus, for example, Fernald(op. cit. 148) emphasized the "absolutely simple monocephalous habit" of the *B. hyperborea* types; but a number of so-called *colpophila* collections more recently made have one or many plants of this habit (e.g., *Fassett* 848 and 2111; *Svenson & Fassett* 889). Since Macoun, in his collecting, failed to save any but the three small specimens that Greene later took for his (Greene's) type of *B. hyperborea*, obviously, for comparison (and if we disregard for the moment all geographic considerations) we must select *colpophila* specimens of a growth stage equivalent to that in the Macoun material.

[2] *Norton, Welden, & Haren*, Nonesuch River, Scarborough, Maine, September 25, 1924 (type, Gray: cotype, N. Eng.); *A. H. Norton*, eodem loco, August 20, 1919 (Gray).

Bidens hyperborea var. β. **cathancensis** Fern.
Rhodora 20: 149. 1918.

Herba 3–7 dm. alta, ramis valde adscendentibus. Folia membranacea costa centrali subtus perspicua, apice longe attenuata, principalia 0.6–1.4 dm. longa, dentibus acribus gracilibusque ad basim raro 0.5 mm. latitudine excedentibus, numerosis. Involucri bracteae exteriores 4–9, saepius lineares raro lanceolatae, apice acutae vel acuminatae, margine integrae, 1.5–3.5 cm. longae. Achaenia exteriora corpore 6–8.5 mm. longa et 1.4–1.7 mm. lata, interiora corpore 7.5–10 mm. longa et 1.2–1.6 mm. lata, aristis nunc 2 nunc usque ad 4, marginalibus 3–5 mm. longis.

Type specimen: Collected by *Merritt Lyndon Fernald* and *Bayard Long*, No. "14927" (surely a misprint for 14827), tidal mud flats of Cathance River, Bowdoinham, Maine, September 14–19, 1916 (Gray).

Distribution: Known only from estuaries of southern Maine.

Specimens examined: *N. C. Fassett* 74, soft mud of tidal flats, just below high tide level, Bowdoinham, August 26, 1920 (Gray); *idem* (similiter) 74, atque 75, bordering mud flats at high tide level, Bowdoinham, September 2, 1920 (Field); *idem* 160, tidal shores of Kennebec River, East Bowdoinham, August 24, 1921 (Gray); *idem* 191, muddy shores, submersed at high tide, west shore of Kennebec River, Bowdoinham, August 24, 1921 (N. Eng.); *idem* 192, tidal mud along Muddy River, Bowdoinham, August 23, 1921 (N. Eng.); *idem* 910, tidal shores of Merrymeeting Bay, Bowdoinham, August 23, 1921 (Gray); *idem* 911, tidal shores, mouth of West Branch, Bowdoinham, August, 1921 (Gray); *idem* 2117 and 2119, tidal shores of Kennebec River, Hatch's Corners, West Dresden, September 9, 1924 (Gray); *idem* 2121, tidal shores of Eastern River, Dresden, September 13, 1924 (Gray); *M. L. Fernald & Bayard Long* 295, tidal flats, Bowdoinham, September 19, 1906 (Del.; Phila.); *iidem* 14825, tidal mud flats of Cathance River, Bowdoinham, September 14 and 19, 1916 (Cop.; Gray; N. Eng.); *iidem* 14827, eodem loco et temporibus (doubtless type material; Gray; N. Eng., 2 sheets); *iidem* 14828, eodem loco et temporibus (Gray; N. Eng.).

Bidens hyperborea var. γ. **arcuans** Fern.
Rhodora 25: 44. 1923.

Herba 2–3 dm. alta, caulibus ramosis, ramis imis decumbentibus vel arcuato-adscendentibus. Folia membranacea, attenuato-acuminata, argute serrata, principalia 0.6–1.3 dm. longa, costa subtus prominente. Capitula 15–30-flora. Involucri bracteae exteriores

3–5, lineari-lanceolatae, acutae, plus minusve serratae, 2–6 vel etiam –8 cm. longae. Achaenia exteriora corpore 5–5.6 mm. longa et ± 2 mm. lata, interiora corpore 8.5–9.5 mm. longa et 1.8–2.4 mm. lata, aristis plerumque 4, marginalibus 4–4.7 mm. longis.

Type specimen: Collected by *Merritt Lyndon Fernald* and *Arthur Stanley Pease*, No. 25321, tidal mud of Miramichi River, Newcastle, New Brunswick, July 30, 1922 (Gray, 2 sheets).

Distribution: Known only from type locality of Newcastle, New Brunswick.

Specimens examined: *Fernald & Pease* 25321 (type, Gray, 2 sheets).

Bidens hyperborea var. δ. **laurentiana** Fass.
Rhodora 27: 169. 1925.

Herba 1–3 dm. alta, subsimplex ramis adscendentibus supra vel interdum etiam ramis tenuibus infra ramosa. Folia principalia adscendentia, lanceolata, non attenuata, 3–11 cm. longa, dentata 1–5 jugis dentium basi 1 mm. latitudine excedentium. Involucri bracteae exteriores 3–6, lanceolatae, obtusae, 1–3.5 (–4.5) cm. longae et 1.5–5 (–8) mm. latae, plerumque integrae raro dentatae 1–2 jugis dentium. Achaenia exteriora corpore 7–8 mm. interiora corpore 8–10 mm. longa, aristis 4, marginalibus 3.5–4 mm. longis.

Type specimen: Collected by *Fr. Marie-Victorin*, No. 15461, at a little higher than the Bridge of Quebec, shores in the intercoastal zone with *Gentiana Victorinii*, Cap-Rouge, Quebec, August 29, 1922 (Gray, 2 sheets).

Distribution: Provinces of New Brunswick and Quebec.

Specimens examined: *Marie-Victorin* 15461 (type, Gray, 2 sheets); *idem* 21207, estuarine shores, Cap-Rouge, Quebec, August 19, 1925 (Gray, 2 sheets); *Fr. Rolland* 15460, shores at Beauport, near City of Quebec, Quebec, August 8, 1922 (Gray); *H. K. Svenson & N. C. Fassett* 819, estuary of Jacquet River, Durham, New Brunswick, August 17, 1923 (Gray); *iidem* 846, tidal flats above Mirimichi River, 5 miles above Newcastle, New Brunswick, August 19, 1923 (Gray); *iidem* 882, tidal shores of Eel River, Dalhousie, New Brunswick, August 16, 1923 (Gray); *iidem* 883, tidal shores of Tabusintac River, Almwick, New Brunswick, August 18, 1923 (Gray); *iidem* 885, muddy tidal shore of Boyer River, St. Michel, Quebec, August 9, 1923 (Gray); *iidem* (similiter) 885, clayey tidal shores of St. Lawrence River, Montmagny, Quebec, August 9, 1923 (Gray); *iidem* 886, tidal shores of Kouchibouguacis River, Bretagne, New Brunswick, August 20, 1923 (Gray); *iidem* 887, tidal flats of Tetagouche River,

Bathurst, New Brunswick, August 17, 1923 (Gray); *iidem* 888, tidal flats of Kouchibouguacis River, Charleton, New Brunswick, August 20, 1923 (Gray); *iidem* 889, 893, 897, and 898, tidal flats of Restigouche River, Restigouche County, New Brunswick, August 16, 1923 (Gray; num. 893 *B. cernuae* similis); *iidem* 896, tidal shores of Mirimichi River, Newcastle, New Brunswick, August 19, 1923 (Gray); *iidem* 912, tidal flats of St. Lawrence River, St. Jean-Port-Joli, Quebec, August 10, 1923 (Gray).

A very imperfectly understood variety. Some of the plants determined by Fassett as belonging here are included by me under var. *gaspensis* (e.g. *Svenson & Fassett* 881; *Marie-Victorin* 15459; *Collins, Fernald, & Pease*, dead waters between Baldé and the Baie des Chaleurs, Bonaventure River, Quebec, August 5–8, 1904; *iidem* 5871).

Bidens hyperborea var. ε. **Svensonii** Fass.
Rhodora 27: 170. 1925.

Herba 1–2.5 dm. alta, ramis inferioribus arcuato-adscendentibus var. *gaspensem* simulans vel subsimplex. Folia principalia patentia vel adscendentia, apice obtusa, dentibus utrinque 1–3 grossis obtusis. Involucri bracteae exteriores (2 vel) 3 vel 4, lanceolatae, apice obtusae, utrinque dentatae dentibus obtusis 1 vel raro 2; interiores apice plus minusve rotundatae, 7–9 mm. longae. Achaenia exteriora corpore 6 mm. longa, interiora corpore 8 mm. longa, aristis 4, marginalibus 2.5–3 mm. longis.

Type specimen: Collected by *Henry Knute Svenson* and *Norman Carter Fassett*, No. 936, tidal shores, Rimouski River, Rimouski, Quebec, August 14, 1923 (Gray).

Distribution: Known only from type locality of Rimouski, Quebec.

Specimens examined: *Svenson & Fassett* 899, tidal estuary of Rimouski River, Rimouski, August 14, 1923 (Gray); *iidem* 936 (type, Gray).

Bidens hyperborea var. ζ. **gaspensis** Fern. Rhodora 20: 150. 1918.
Pl. LXXIV, figs. *a, c, e, g, i, k, m.*

Herba humilis, plerumque depressa et ramosior, 0.5–2.5 dm. alta, ramis plerumque arcuatis. Folia numerosa, subcarnosa, apice obtusa, costa centrali obscura; principalia 1.5–6.5 cm. longa, integra vel 1–2 jugis dentium crassorum instructa. Capitula numerosa discoidea vel subradiata. Involucri bracteae exteriores 2–4, oblanceo-

latae, subobtusae, integrae vel dentatae, 2–6 cm. longae. Achaenia iis var. *cathancensis* similia.

Type specimen: Collected by *J. Franklin Collins, Merritt L. Fernald,* and *Arthur S. Pease,* sine num., submerged at high tide, brackish shores about mouth of Dartmouth River, Gaspé Peninsula, Quebec, August 26 and 27, 1904 (Gray).

Distribution: Quebec.

Specimens examined: *Collins, Fernald, & Pease,* brackish shore, submerged at high tide, alluvial islands at mouth of Bonaventure River, Bonaventure Co., August 4, 1904 (Gray, 2 sheets); *iidem,* brackish shores, submerged at high tide, mouth of St. John River, Douglastown, August 23, 1904 (Gray); *iidem,* brackish shores about mouth of Dartmouth River (type, Gray: cotypes, Berl.; Can.; Carn.; Cop.; Gray, 2 sheets; Kew); *iidem,* brackish pools and dead waters near mouth of Dartmouth River, August 26–27, 1904 (Gray); *iidem* 5871, dead waters, between Baldé and Baie des Chaleurs, Bonaventure River, Bonaventure Co., August 5–8, 1904 (Gray); *Marie-Victorin* 15459, shores, Saint François de l'Ile d'Orleans, August 24, 1922 (Gray); *J. Rousseau* 25346, flats at Montmagny, September 10, 1926 (Gray); *Svenson* and *Fassett* 881, rocky places, tidal shores of the St. Lawrence River, Cap St. Ignace, August 9, 1923 (Gray).

EXPLANATION OF PLATE LXXIV

Bidens hyperborea, figs. *b, d, f, h, j, l: b,* entire fruiting specimen, ×0.63; *d,* exterior involucral bract, ×2.52; *f,* interior involucral bract, ×2.52; *h,* palea, ×2.52; *j,* disc floret, ×2.52; *l,* achene, ×2.52; all from type sheet.

Bidens hyperborea var. *gaspensis,* figs. *a, c, e, g, i, k, m: a,* flowering and fruiting specimen, ×0.63; *c,* exterior involucral bract, ×2.52; *e,* interior involucral bract, ×2.52; *g,* ray floret, ×2.52; *i,* palea, ×2.52; *k,* disc floret, ×2.52; *m,* achene, ×2.52; all from *Collins, Fernald,* and *Pease,* mouth of Bonaventure River, Bonaventure County, Quebec, August 4, 1904, in Hb. Gray.

95. **Bidens diversa** Sherff, Bot. Gaz. 76: 159. 1923.
Pl. LXXV, figs. *a, b, d–i.*

Involucrum glabrum vel subglabrum, ligulis usque ad 6 mm. longis. *B. diversa* sensu stricto.

Involucri bracteae exteriores ciliatae, ligulis 7–13 mm. longis. var. *β. megaglossa.*

Herba annua, erecta, gracilis, glabra, ramosa, 3–6 dm. alta, caule tetragono. Folia petiolata petiolis 0.5–2 cm. longis, petiolo adjecto 3–6 cm. longa, bipinnata, segmentis paucis, linearibus, acriter calloso-apiculatis, membranaceis, margine saepe revolutis, 0.3–1.2 mm. latis. Capitula ramos terminantia, tenuiter pedunculata pedunculis usque ad 15 cm. longis, radiata, pansa ad anthesin 8–13 mm. lata et 6–9 mm. alta. Involucri glabri vel subglabri bracteae valde inaequales (diversae), exteriores 5–8, lineares, obtuse vel acriter calloso-apiculatae, 1–2 mm. longae, interiores lanceolatae, 4–5 mm. longae. Flores ligulati circ. 6–8, lutei, ligula elliptico-oblongi, apice profunde incisi, 3–7 mm. longi. Achaenia submatura obcompressa, atro-brunnea, lineari-oblonga, faciebus glabra, exalata, marginibus et apice erecto-setosa, corpore circ. 5 mm. longa et usque ad 0.7 mm. lata, biaristata aristis retrorsum hamosis circ. 1 mm. longis.

Type specimen: Collected by *Antunes*, No. 315, in forest at altitude of 1,760 meters, Mounyino, Portuguese West Africa, March, 1901 (Berl., 2 sheets).

Distribution: Known only from type locality of Mounyino, Portuguese West Africa.

Specimens examined: *Antunes* 315 (type, Berl., 2 sheets).

The species may be noted especially for its small flowering heads, the inequality of the exterior and interior involucral bracts, and the sharply and deeply bilobed ligules. It is close to *Bidens paupercula*, but is easily distinguished by the characters of the rays and involucre.

Bidens diversa var. *β.* **megaglossa** Sherff, Bot. Gaz. 92: 202. 1931. Pl. LXXV, fig. *c*.

A specie bracteis exterioribus ciliatis, ligulis 7–13 mm. longis differt.

Type specimen: Collected by *Newton*, at Biballa, Serra da Chella, Angola, June 3, 1883 (Berl., 2 sheets).

Distribution: Known only from type locality in Angola.

Specimens examined: *Newton*, Biballa, Serra da Chella, etc. (2 type sheets, Berl.).

EXPLANATION OF PLATE LXXV

Bidens diversa, figs. *a*, *b*, *d–i*: *a*, flowering specimen, ×0.62; *b*, exterior involucral bract, ×6.23; *d*, interior involucral bract, ×6.23; *e*, ray floret, ×6.23; *f*, palea, ×6.23; *g*, disc floret, ×6.23; *h*, *i*, achenes, ×6.23; all from 1st type sheet.

Bidens diversa var. *megaglossa*, fig. *c*: exterior involucral bract, ×6.23; from type.

96. **Bidens Schaffneri** (Gray) Sherff, Bot. Gaz. 56: 493. 1913. Pl. LXXVI.

Coreopsis Schaffneri Gray, Proc. Amer. Acad. 19: 15. 1884.

Herba plerumque erecta, e radice perenni vel forsan saepius omnino annua, pallide viridis, glaberrima, 6–9 dm. alta; caulibus tetragonis, ramosis, gracilibus. Folia late petiolata petiolis 0.8–2 cm. (vel ultra) longis, petiolo adjecto 4–11 cm. longa, alia integra alia pinnatim 3–5-partita; laminis vel foliolis anguste linearibus, membranaceis vel oculis saepe fere subcarnosis, integerrimis, apice acutis, 2–9 cm. longis, 0.6–1.6 mm. latis. Capitula corymboso-paniculata, radiata vel rarius discoidea, pansa ad anthesin 1.3–1.7 cm. lata et 6–8 mm. alta, tenuiter pedunculata pedunculis 1–6 cm. longis. Involucrum basi pubescens; bracteis exterioribus 6–8, anguste linearibus, apice acutis et mucronulatis, ciliatis, 3–5 mm. longis, interiores lanceolatas saepe aequantibus. Flores ligulati aurei, ligula elliptico-oblanceolati, apice denticulati vel subintegri, 7–10 mm. longi. Achaenia lineari-clavata et inferne attenuata, obcompresso-tetragona, nigra, supra antrorsum plus minusve setulosa, corpore 3.5–6.5 mm. longa, plerumque breviter biaristata; aristis fere levibus, 0.2–0.6 mm. longis, demum interdum deciduis.

Type specimen: Collected by *J. G. Schaffner*, No. 202 pro parte, Valley of San Luis Potosí, State of San Luis Potosí, Mexico, August, 1876 (Gray).

Distribution: Central Mexico from states of Durango and San Luis Potosí southward to states of Jalisco, Guanajuato, and Hidalgo.

Specimens examined: *A. Dugès* 9, State of Guanajuato, 1906 (Gray); *Edward Palmer* 268, vicinity of Durango, State of Durango, April–November, 1896 (Calif.; U.S.); *idem & C. C. Parry* 488, alt. 1,800–2,400 meters, probably near San Luis Potosí, State of San Luis Potosí, 1878 (Brit.; Field; Gray; Kew; N.Y.; Par.); *iidem* 488½, eodem loco et tempore (Field; Gray; Kew, 2 sheets; N.Y.; Par.); *C. G. Pringle* 11487, wet places, Nopala Station, Hidalgo, September 3, 1903 (Berl.; Cop.; Kew; U.S.; forma involucri bracteis exterioribus interdum 12–16, aristis interdum longioribus et omnino nudis); *J. N. Rose* 2530 p.p., near Huejuquilla, Jalisco, August 24, 1897 (U.S.); *idem* 2605, road between Mesquites and Monte Escobedo, Jalisco, August 26, 1897 (U.S.); *J. G. Schaffner* 202 (*hb. A. Vigner* No. 642) pro parte (type, Gray: cotypes, Brit.; Mun.; N.Y.); *idem* (similiter) 202, eodem loco, 1879 (Berl.); *idem* 203 (*hb. A. Vigner* No. 643) pro parte, eodem loco, October, 1879 (Boiss.; Brit.; N.Y.).

Evidently placed by Gray in *Coreopsis* merely because of the practically smooth awns of the achenes. In general habit, also in the shape of the achenes (which are tetragonal and lack wings), Gray's type is a true *Bidens*. The associate types collected by Parry and Palmer (488 and 488½, not "448 and 448½" as erroneously printed in Gray's original citation), in the Gray Herbarium, match very well Schaffner's No. 202, ibid., the type. In the Boissier Herbarium, *Schaffner* 203 is accompanied on the sheet with additional material which is true *Bidens angustissima* H.B.K. Elsewhere (Brit.; Gray; Mun.), additional sheets of this number are entirely *B. angustissima*. Gray's description of the root as perennial may have sprung from some similar confusion (Gray did in fact actually compare his plant with *B. angustissima*, "*facie Bidentis angustissimae*"). Where the basal portions have been available in the herbarium, they have seemed to connote an annual habit.

EXPLANATION OF PLATE LXXVI

Bidens Schaffneri: a, flowering and fruiting specimen, ×0.60; *b*, exterior involucral bract, ×5.43; *c*, interior involucral bract, ×5.43; *d*, ray floret, ×3.62; *e*, palea, ×5.43; *f*, disc floret, ×6.2; *g* (outer), *h* (inner), achenes, ×3.62; all from *Parry & Palmer* 488, in Hb. Mo.

97. **Bidens Ferulaefolia** (Jacq.) DC. Prodr. 5: 603. 1836. Pl. LXXVII.

Coreopsis Ferulaefolia Jacq. Hort. Schoenbr. 3: 65, *pl. 375*. 1798.

Coreopsis ferulacea Hort. ex Enum. Stirp. in Horto Acad. Pisano Viv. Ann. 1801 (probabiliter).

Coreopsis incurva Moench, Meth. Suppl. 245. 1802 (fide auctorum).

Bidens procera D. Don, Bot. Reg. 8: 684, *pl. 684*. 1822.

Coreopsis angustifolia Pavón ex D. Don, loc. cit.

Kerneria Ferulaefolia (Jacq.) Cass. Dict. Sci. Nat. 51: 473. 1827.

Coreopsis Ferulifolia Jacq. ex Ind. Lond. 2: 294. 1930.

Achaenia corpore 4–6 mm. longa, compacte adgregata, 2-aristata.
Achaenia quam paleae maturae interdum breviora; aristis interdum deciduis.....*B. Ferulaefolia* sensu stricto.
Achaenia quam paleae maturae saepius breviora; aristis multo saepius deciduis.....var. γ. *ludens*.
Achaenia corpore plerumque circ. 8 mm. longa, laxe adgregata, saepe 3- vel 4-aristata.....var. β. *Foeniculaefolia*.

Herba annua vel biennis, erecta, 0.3–1 (–2.5) m. alta; caule subobtuse tetragono, glabro vel supra parce pubescenti, ramoso

BIDENS ABADIAE DC. (figs. *a*, *c–i*); var. PILOSOIDES Sherff (fig. *b*)

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ramis suberectis, teretiusculis vel angulatis. Folia petiolata petiolis 0.5–2.5 cm. (vel ultra) longis, petiolo adjecto 5–8 (–17) cm. longa, glabra vel hispidula, saepe inconspicue ciliata, membranacea vel fere subcarnosa, summa pinnata, inferiora bi- vel subtripinnata; segmentis anguste vel mediocriter linearibus, sub apice acutis vel subobtusis, apice mucronulatis. Capitula terminalia, erecta, corymbosa, radiata, pansa ad anthesin 2.2–3.3 cm. lata et 6–9 cm. alta, tenuiter pedunculata pedunculis pilosiusculis, 1–6 cm. longis. Involucrum basi saepe hispidum; bracteis exterioribus 8–10, linearibus, ciliatis, extrinsecus glabratis vel pubescentibus, apice obtusis vel mucronulatis, 2.5–4 mm. longis; interioribus ovato-lanceolatis, late et perspicue diaphano-marginatis, quam exterioribus paulo longioribus. Flores ligulati 5, aurei, ligula late elliptici vel ovato-oblanceolati, saepe tridenticulati, 1.1–1.7 cm. longi. Achaenia lineari-cuneata, nigrescentia, obcompresso-tetragona vel subplana, angulis erecte scabrida vel tuberculato-strigosa, corpore 4–6 mm. longa, exalata, biaristata; aristis tenuibus, flavidis, retrorsum hamosis, 1–2 mm. longis, interdum deciduis.

Type specimen: Cultivated at Schönbrunn, Austria, from achenes of unknown geographic origin. The plants were raised in the open air during the summer. Given the shelter of a hothouse, they bloomed in November and December.[1]

Distribution: Southern Arizona southward through western Mexico to the states of Mexico and Jalisco, and very rarely into Guatemala.

Specimens examined: *Bro. G. Arsène*, near Laguna de San Baltasar, vicinity of Puebla, State of Puebla, Mexico, August 16, 1906 (U.S.); *idem*, Mayorazgo, vicinity of Puebla, eodem tempore (U.S.); *idem* 102, alt. 2,170 meters, Cerro San Juan, vicinity of Puebla, August 5, 1906 (U.S.); *idem* 1410, alt. 2,120 meters, Mayorazgo, upon the Atoyac, vicinity of Puebla, July 18, 1907 (U.S.); *idem* 2414, alt. 1,850 meters, road of the Park, vicinity of Morelia, Michoacán, Mexico, August 1, 1909 (U.S.); *idem* 3080, alt. 1,900 meters, flooded places, vicinity of Morelia, October 3, 1909 (Gray); *idem* 10165, between haciendas Santa Bárbara and Cristo, upon the Alseseca,

[1] I do not appear to have found type material of this at Vienna, either at the Hofmuseum (Mus. V.) or at the University of Vienna's Herbarium (U.V.) in the Vienna Botanical Garden. However, the plant listed below as having been cultivated by Jacquin's son in 1809 (and given to DeCandolle) and now at the Delessert Herbarium, matches the type plate very closely. Then, too, the specimen from the elder Jacquin's own herbarium, although raised at the Vienna Botanical Garden (Hort. Vindob.) instead of the Schönbrunn Garden, a short distance away, was undoubtedly from the original material or from a lineal descendant.

vicinity of Puebla, June 27, 1907 (U.S.); *E. Bourgeau* 502 pro parte, Guadalupe Hidalgo, State of Mexico, August 23, 1865–1866 (Berl.; Boiss.; Gray; Kew; U.S.) and July 10, 1865 (Kew); ex *herb. Fauchei* 50 (Boiss.); *C. V. Hartman* 47, in ditch, Fronteras, Sonora, Mexico, September 25, 1890 (Gray); *idem* 834, San Pedro, Sonora, September 14, 1890 (Gray); *idem* 961, between San Pedro and Fronteras, Sonora, September 20–24, 1890 (Gray); *idem* 991, Fronteras, Sonora, September 25–29, 1890 (Gray); ex *Hort. Berol.*, 1858 (Berl.); ex *eodem*, July 18, 1863 (Berl.); ex *Hort. Dresd.*, July 18, 1878 (Berl.); ex *Hort. Bot. Monac.*, 1845 (Mun., 4 sheets); ex *Hort. Ducis Orleansis*, Paris, 1820 (Mus. V.); ex *Hort. Par.* (Del., 2 sheets); ex *eodem*, November 1, 1814 (Kew); ex *Hort. Pelon.*, November, 1819 (Kew); ex *herb. Jacquinii* ex *Hort. Vindob.* (Mus. V.); *Jacquin fil.*, cult. in 1809 (Del.); *J. G. Lemmon* 332, southern Arizona, 1881 (Gray); *idem* 2767 et 2769, near Fort Huachuca, Arizona (Gray); *idem & uxor*, Rucker Valley, Chiricahua Mts., Arizona, September, 1881 (Brit.; Calif.); *iidem* 2768, spring at "Hermitage," eodem loco et tempore (Calif.); *Edward Palmer* 316 and 393, southwestern Chihuahua, August–November, 1885 (Gray; in Phila. num. 393 caulis folia superiora pro maxima parte indivisa, angusto-elongata et faciem faciei *B. aureae* adpropinquantem habet); *idem* 425, Guadalajara, Jalisco, July–October, 1886 (U.V.); *idem* 426, eodem loco et tempore (Boiss.; Mo.; U.S.); *idem* 668, 672, 677, and 682, vicinity of Durango, State of Durango, April–November, 1896 (668, Calif. and Gray; 672, U.S.; 677, Berl. and Gray; 682, Mo., 2 sheets, and Gray); *idem* 933, wet bottoms along watercourses, eodem loco, July–November, 1896 (Berl.; Boiss.; Calif.; Gray; Mo., 2 sheets); ex *herb. Pavonii* (Boiss., sub nom. *Coreopside tripinnatifida*); *idem*, Mexico (Boiss.); *C. G. Pringle* 136, Mexico (Gray); *idem* 758, wet meadow, Sacramento Valley, Mexico, September 27, 1886 (Berl.); *J. N. Rose* 2530 p.p., Huejuquilla, Jalisco, August 24, 1897 (Gray); *J. T. Rothrock* 671, Sonoita Valley, southern Arizona, September, 1874 (Gray); *Osbert Salvin*, Volcán de Fuego, Guatemala, August, 1873 (Kew); *J. G. Schaffner*, near San Angel, Mexico, September, 1855 (Gray; N.Y.); *idem* 202 p.p., Morales Mts., Valley of San Luis Potosí, State of San Luis Potosí, October, 1880 (Kew; forma, uno achaenio corpore 12.5 mm. longo, aristis 3–3.3 mm. longis); *idem* 213, Valley of Mexico, State of Mexico (Berl.; Gray); *Schmitz*, along railroad from Guadalupe, State of Mexico (Mus. V., 2 sheets); *Walther Schumann* 6, Mexico, September 20, 1884 (Berl.); *idem* 108, river bank, Mexico, September 10, 1885 (Berl., 2 sheets; U.V.);

BIDENS BRANDEGEEI Sherff (figs. *a–k*)
BIDENS CANESCENS Bertol. (figs. *l–s*)

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idem 109, Mexico, 1885 (Berl., 2 sheets); *George Thurber* 1102 p.p., Sonora, September 11, 1851 (Field; Gray); *J. W. Toumey* 58, Chiricahua Mts., Arizona, July 26, 1899 (Calif.); *C. H. T. Townsend & C. M. Barber* 315, alt. 2,160 meters, State of Chihuahua, September 6, 1899 (Boiss.; Mo.); *Charles Wright* 1232, Sonora, 1851 (Gray; Mo., sub num. 1232*bis*); ex *herb. Zuccarinii*, cult. 1817 (Mun.).

The type of *Bidens procera* D. Don had been raised from seed sent by Don José Pavón to Lambert. Pavón had received the material from Mexico, but the exact locality in Mexico is not stated by Don. I have not knowingly seen the Lambert Herbarium specimens which Don cited, but have studied carefully an original specimen from Pavón's own herbarium (Boiss.). This agrees with Don's description and plate fairly well, the chief differences being attributable to the fact that Don based his description mainly upon the taller and more robust cultivated plants. Thus, early in his description, Don described his plant as "orgyalis v. ultra," and later he described it as "6 or 8 ft. high." I have seen no spontaneous specimens that measured nearly so tall as in Don's cultivated plants. These latter, however, are seen from Don's description and plate to match the original plate and the various cultivated specimens, extant in European herbaria, of *B. Ferulaefolia* (Jacq.) DC.

Most of the spontaneous specimens have a low stature (5–8 dm. high) and slender branches; very rarely have they been found to resemble the cultivated plants (illustrated especially well in Jacquin's plate), and then they appear to have grown in an aqueous habitat.

Bidens Ferulaefolia var. *β.* **Foeniculaefolia** (DC.) Sherff, Bot. Gaz. 81: 39. 1926. Pl. LXXVIII, figs. *a–i.*

Bidens Foeniculaefolia DC. Prodr. 5: 603. 1836.

Coreopsis foeniculacea Moc. & Sessé ex DC. loc. cit.

Bidens carpodonta Sherff, Bot. Gaz. 64: 25. 1917.

A specie differt: habitu minus robusta, pilosior, foliorum segmentis angustioribus. Achaenia pauciora, laxe adgregata, corporibus plerumque circ. 8 mm. longis et circ. 0.6 mm. latis, aristis saepe 3 vel 4.

Type specimen: Collected by *Mr. Méndez*, west of Guanajuato, District of León, State of Guanajuato, Mexico, in 1829 (Del.).[1]

[1] Alamán collected separate specimens at the same place and time. Méndez and Alamán each collected additional plants south of Guanajuato. DeCandolle had four sheets in his herbarium. He clearly had both the Méndez and the Alamán plants, but only those from the west of Guanajuato, in mind when writing his

Distribution: In Mexico from the State of Sonora southeastward to the State of Guanajuato, and, if a specimen purporting to be by *Nicolás* is truthfully labeled (cf. Standley, Science, new ser. 65: 130–133. 1927), further southeastward to the State of Puebla.

Specimens examined: *Alamán*, west of Guanajuato, Distr. of León, State of Guanajuato, 1829 (Del.); *idem* 26, south of Guanajuato, 1829 (Del.; Par.; Webb); *Josiah Gregg* 397, Mexico, September 1, 1848–1849 (Gray; Mo.); *Méndez*, west of Guanajuato, etc. (type, Del.), and south of Guanajuato (Del.); *Edward Palmer* 681, vicinity of Durango, State of Durango, September, 1896 (Berl.; Kew; Mo., 2 sheets, etc.); *George Thurber* 1102 p.p., Sonora, September, 1851 (Field).

Asa Gray suspected *Bidens Foeniculaefolia* DC. of belonging to *B. procera* (Syn. Fl. 1, pt. 2: 298. 1884; cf. Proc. Amer. Acad. 19: 16. 1884). The resemblance is very close, but *B. Foeniculaefolia* tends to have a more wiry aspect, with narrower leaf divisions and more pubescence. The achenes are less numerous and less compactly arranged in the heads than those of typical *B. procera*, or *B. Ferulaefolia* as we must call it. Furthermore, their bodies average about 8 mm. long and 0.6 mm. wide, while the bodies of *B. Ferulaefolia* are usually shorter and wider than this. The aristae are usually 2, but at times 3 or 4,[1] while in *B. Ferulaefolia* they seem constantly 2. At the most, *B. Foeniculaefolia* does not exhibit enough differences from *B. Ferulaefolia* to warrant more than varietal distinction.

Bidens Ferulaefolia var. γ. **ludens** (Gray) Sherff,
Bot. Gaz. 81: 39. 1926. Pl. LXXVIII, figs. *j–s*.

Bidens ludens Gray, Proc. Amer. Acad. 21: 390. 1886.

A specie vix differt. Achaeniorum aristae plus valde deciduae et achaenia ipsa saepius quam paleae maturae breviora.

Type specimen: Collected by *Cyrus Guernsey Pringle*, No. 293, on cool hillsides and along streams, northwest of Chihuahua, State of Chihuahua, Mexico, October, 1885 (Gray).

Distribution: Known only from the widely separated states of Chihuahua and Oaxaca, Mexico.

Specimens examined: *E. W. Nelson* 1438, alt. 1,650–2,250 meters, Valley of Oaxaca, State of Oaxaca, September 20, 1894 (Gray; U.S.);

description ("in Mexico ad occid. urbis Guanaxuato in prov. Leoninà leger. et mecum comm. cl. Mendez et Alaman"). Technically, the Méndez plant from west of Guanajuato would probably be best accepted as the actual type.

[1] DeCandolle is seen, from his description ("biaristatis"), to have overlooked the additional aristae on his own material.

Pringle 293 (type, Gray); *idem* 757 pro parte, mountains near Chihuahua, State of Chihuahua, October 3, 1886 (Berl.; Brit.; Mo.; U.V.); *A. Wislizenus* 178, mountains at Cosiquiriachi, west of Chihuahua, September 19, 1846 (Mo.).

Asa Gray, shortly before his death, applied the name *B. ludens* to *Pringle* 293. Gray's type specimens do not differ much in general appearance from *B. procera*, which, as we have seen above, is referable to the earlier synonym *B. Ferulaefolia*. The fruiting heads, however, are noticeable because most of the achenes lack or have dropped their aristae.[1] In certain of the foregoing collections cited for *B. Ferulaefolia* proper, particularly some of Palmer's plants, there are heads in which most of the achenes have likewise lost their aristae. Indeed, Don had noted this as one of the characters of his *B. procera*.[2] Another character noted in Gray's type material is the usually greater proportionate length of the mature paleae. In most of the heads they are longer than the achenes, but on the same plant some heads may be found with exceptionally long achenes, these surpassing the paleae. Evidently Gray's *B. ludens* is best regarded as merely a variety of *B. Ferulaefolia*, if indeed entitled to rank higher than just a forma.

EXPLANATION OF PLATE LXXVII

Bidens Ferulaefolia: *a*, flowering specimen, ×0.66; *b*, exterior involucral bract, ×3.3; *c*, interior involucral bract, ×3.3; *d*, ray corolla, ×1.98; *e*, palea, ×3.3; *f*, disc floret, ×3.3; *g*, achene, ×3.3; all from *Hort. Pelon.*, November, 1819, in Hb. Kew.

EXPLANATION OF PLATE LXXVIII

Bidens Ferulaefolia var. *Foeniculaefolia*, figs. *a–i: a*, entire flowering and fruiting specimen, ×0.58; *b*, exterior involucral bract, ×3.49; *c*, interior involucral bract, ×3.49; *d*, ray corolla, ×3.49; *e*, palea, ×3.49; *f*, disc floret, ×3.49; *g* (outer), *h* and *i* (inner), achenes, ×3.49; all from *Palmer* 419 (cotype of *Bidens carpodonta* Sherff), in Hb. U.S.

Bidens Ferulaefolia var. *ludens*, figs. *j–s: j*, flowering and fruiting specimen, ×0.58; *k*, exterior involucral bract, ×3.49; *l*, interior involucral bract, ×3.49; *m*, ray corolla, ×3.49; *n*, palea, ×3.49; *o*, disc floret, ×3.49; *p* (average outer), *q* (average inner), *r* and *s* (extremely longest inner), achenes, ×3.49; *j*, mainly from cotype

[1] "... aristis subulatis ... (persistentibus vel deciduis)."—Gray, loc. cit.

[2] "... aristis ... deciduis ... having flat cuneiform seed with deciduous (not permanent) awns."—Don, loc. cit.

in Hb. Field, modified slightly from *Pringle* 757, in Hb. Field; *k–l*, *n–s*, from cotype in Hb. Field; *m*, from *Pringle* 757, in Hb. Field.

98. **Bidens Coreocarpoides** Sherff, Bot. Gaz. 97: 185. 1935.

Herba glabrata, ramosa, erecta e radice simplici tamen forsan perennis, ± 3 dm. alta, ramis tenuibus suberectis. Folia non perspicua, pinnatim 3- vel 5-partita vel summa simplicia, breviter petiolata petiolis plus minusve hispido-ciliatis 2–8 mm. longis, petiolo adjecto 1.5–3 cm. longa, segmentis rhachi similibus linearibus crassiusculis acriter indurato-apiculatis 0.4–1 mm. latis. Capitula elongato-pedunculata pedunculis subcorymbose dispositis tenuissimis saepius nudis plerumque 8–12 cm. longis, radiata, pansa ad anthesin circ. 1.5–1.8 cm. lata et circ. 6–7 mm. alta. Involucrum glabrum, bracteis exterioribus circ. 8, adpressis, oblongo-linearibus, apice subacuto induratis, quam interioribus oblongo-ovatis dimidio brevioribus. Flores ligulati plerumque 8, flavi, circ. 7-nervati, ligula plus minusve oblongi, apice denticulati, 7–9 mm. longi. Flores disci sub 3 mm. longi. Ovaria plana, oblongo-linearia vel cuneato-linearia, corpore ± 1.5 mm. longa, apice biaristata aristis retrorsum hamosis.

Type specimen: Collected by *Edward William Nelson* and *Edward Alphonso Goldman*, No. 7389, at altitude of 15–60 meters, from Cape San Lucas to San José del Cabo, southernmost Baja California, January 4, 1906 (U.S.).

Distribution: Known only from type locality in southernmost Baja (Lower) California.

Specimens examined: *Nelson & Goldman* 7389 (type, U.S.).

99. **Bidens Townsendii** Sherff, Bot. Gaz. 89: 363. 1930.
Pl. LXXIX.

Herba annua, erecta, subsimplex, 8–10 dm. alta, caule acriter tetragono glabra. Folia tenuiter petiolata petiolis usque ad 2.5 cm. longis, petiolo adjecto circ. 8–10 cm. longa, 1–2-pinnata; segmentis primariis lateralibus circ. 2 jugis, superioribus simplicibus inferioribus saepius tripartitis, segmentis secundariis lanceolatis membranaceis acriter serratis adpresse setosis, apice acuminatis, sub medio circ. 0.7–1.7 cm. latis. Capitula pauca, tenuiter pedunculata pedunculis 3–6 cm. longis, subradiata, pansa ad anthesin ± 1.2 cm. lata et circ. 6 mm. alta. Involucri bracteae subaequales exteriores 8–12, anguste lineares, superne non spathulato-dilatatae, apice acerrimo induratae, 3–6 mm. longae, interiores lanceolatae. Flores ligulati ± 5, rudi-

mentarii, ligula obovati, albidi vel subrosacei, plus minusve perspicue striati, circ. 4 mm. longi. Achaenia exalata, exteriora clavata, obcompresso-tetragona, rubido-nigra, hinc inde saepe sparsim setosa, corpore circ. 4–4.5 mm. longa et 1–1.2 mm. lata, apice calva vel biaristata, aristis stramineis retrorsum hamosis circ. 0.5 mm. longis; interiora tenuiter linearia, corpore usque ad 11 mm. longa, nigra, supra marginaliter setosa, biaristata aristis stramineis retrorsum hamosis 1–1.5 mm. longis.

Type specimen: Collected by *Charles Henry Tyler Townsend* and *Charles Melvin Barber*, No. 415, near Chuichupa in the Sierra Madre, State of Chihuahua, Mexico, September 6, 1899 (N.Y.).

Distribution: Known only from type locality in State of Chihuahua, Mexico.

Specimens examined: *Townsend & Barber* 415 (type, N.Y.: cotypes, Gray; Mo.).

EXPLANATION OF PLATE LXXIX

Bidens Townsendii: a, flowering specimen, ×0.7; *b*, fruiting head, ×0.7; *c*, exterior involucral bract, ×5.6; *d*, interior involucral bract, ×5.6; *e*, ray corolla, ×5.6; *f*, palea, ×5.6; *g*, disc floret, ×5.6; *h* and *i* (outer), *j* (inner), achenes, ×5.6; *a*, *c–j*, from cotype in Hb. Mo.; *b*, from type.

100. **Bidens aurea** (Ait.) Sherff, Bot. Gaz. 59: 313. 1915 (ex synon. Ait. nec alior.); ibid. 81: 42. 1926. Pl. LXXX.

Coreopsis aurea Ait.[1] Hort. Kew 3: 252. 1789 (non aliorum).

Bidens mexicana Willd. Herb. No. 15034-1 (nec alior.).

Bidens heterophylla Ortega, Hort. Matr. 99, *pl. 12*. 1798.

Coreopsis lucida Cav. Descrip. 224. 1802.

Coreopsis nitida Hort. R. M. ex Elenchus Pl. Hort. Bot. J. J. Destremx ann. 1805: 10. 1806.

Bidens heterophilla Ort. ex Elenchus, loc. cit. (sphalm).

Bidens luxurians Willd. Enum. Hort. Berol. 847. 1809 (nec alior.).

Coreopsis trichosperma var. "*β. aurea?*" Nutt. Gen. 2: 180. 1818 (tantum quoad synon. Ait.).

Bidens arguta H.B.K. Nov. Gen. et Sp. 4: 181 (231). 1820.

Bidens decolorata H.B.K. op. cit. 182 (233).

Coreopsis tetragona La Llave & Lex. Nov. Veg. Descrip. 1: 31. 1824 (ex descrip. et loco).

[1] Less commonly, but probably with greater justice, cited "Dryander in Aiton."

Bidens arguta var. *luxurians* (Willd.) DC. Prodr. 5: 596. 1836.

Bidens tetragona (La Llave & Lex.) DC. loc. cit.

Bidens longifolia DC. op. cit. 597.

Diodonta aurea (Ait.) Nutt. Trans. Amer. Phil. Soc. ser. 2. 7: 360. 1841 (ex synon. Ait.).

Diatonta aurea (Ait.) Nutt. ex Walp. Repert. 2: 614. 1843 (ex synon. Ait.).

Bidens Warszewicziana Regel cum vars. α. *simplicifolia*, β. *pinnata*, and γ. *bipinnata*, Flora 32: 183–184. 1849.

Bidens heterophylla var. *Wrightii* Gray, Proc. Amer. Acad. 19: 15. 1883; Syn. Fl. N. Amer. 1, pt. 2: 298. 1884.

Bidens heterophylla var. *typica* Fiori in Fiori & Paoletti, Fl. Anal. Ital. 3: 303. 1904.

Bidens aurea var. *Wrightii* (Gray) Sherff, Bot. Gaz. 85: 16. 1928.

Herba erecta, perennis vel interdum annua; caule tetragono, simplici ramosove, viridi vel subpurpurascenti, plerumque 0.5–1 m. alto. Folia submembranacea, plerumque petiolata petiolis plus minusve alatis et 0.2–4 cm. longis, glabra vel interdum tomentula vel supra debiliter pubescentia, petiolo adjecto 0.8–2.2 dm. longa, maxime variabilia; nunc indivisa, linearia vel lanceolata vel etiam elliptico-oblonga, serrata dentibus brevibus longisve vel interdum subintegra, saepe acuminata; nunc 3–5-partita, foliolis lanceolatis linearibusve (raro etiam capillaribus), acriter tenuiterque serratis vel integris, imis interdum connatis ad apicem petioli; nunc rarissime bipinnata, segmentis linearibus et integris. Capitula radiata, pansa ad anthesin 2–5 cm. lata et 0.6–1 cm. alta. Involucri bracteae exteriores 8–17, lineares, apice acuto induratae, hispido-ciliatae, faciebus saepe glabrae, 3–6 mm. longae, bracteis interioribus subaequales. Flores ligulati plerumque 5 vel 6, flavi, ligula obovati, apice subintegri vel irregulariter dentati, 1–3 cm. longi. Achaenia cuneato-linearia, subtetragona, nigra vel subnigra, plus minusve erecto-setosa setis ad basim saepe papilliformibus, corpore 4–7 mm. longa, apice biaristata; aristis flavidis, tenuibus, supra retrorsum hamosis, 1.5–2.7 mm. longis.

Type specimen: Collected at Kew Gardens in 1785, from plants cultivated there from seed introduced that year by *Charles*, Earl of Tankerville. No particular specimen is cited as the type, but the one in London (Brit.) clearly is from the type material.

Distribution: From southern Arizona southward through most parts of Mexico and reaching the Volcán del Fuego and Volcán de

Pacaya, Guatemala; adventive in recent years and becoming established in France and Italy.

Specimens examined: *Alamán*, Mexico, 1831 (Del.); *Alwin Aschenborn* 189 and 433, Mexico (Berl.); *A. Béguinot* 1378 (Burn.); *J. L. Berlandier* 717, Valley of Mexico, State of Mexico, 1827 (type material of *Bidens longifolia* DC.; Berl.; Brit.; Del.; Gray); *idem* 1001, Cordillera de Guchilaque (near Cuernavaca, Morelos), October, 1827 (Berl.; Del.; Mus. V.; Par.); *idem* 1091, Toluca, State of Mexico, October, 1827 (Berl.; Del., 2 sheets); *Mateo Botteri*, Mexico, 1856 (Del.); *E. Bourgeau* 263, Tacubaya, State of Mexico, June 5–15, 1865 (Berl.; Cop.; Gray; Kew); *idem* 382*bis*, ditches near Tacubaya, June 13, 1865 (Boiss.; Gray; Kew, 2 sheets, 1 sub num. 382); *idem* 502 pro parte, Guadalupe, State of Mexico, August 23, 1865 (Mun.); *idem* 603, fields and ditches, Mexico, September 8, 1865–1866 (Kew); *idem* 851, edges of fields at Pedregal, State of Mexico, September 12, 1865 (Berl.; Cop.; Gray; Kew; Mun.); *idem* 957, San Nicolás, State of Mexico, September 27, 1865 (Cop.; Del.; Gray; Kew); *idem* 3084, region of Mt. Orizaba, Mexico, September 20, 1866 (Boiss.; Kew; Par., 3 sheets; Petrop.); *idem* 3084*bis* and 3085, eodem loco et tempore (Kew); *T. S. Brandegee*, banks of Cofradía River, vicinity of Culiacán, Sinaloa, October 20, 1904 (Calif.; Gray); *idem* 323, San Francisquito Mts., Lower California, October 18, 1890 (Calif.; Gray; Phila.); *Carl Ehrenberg* 353, Mexico (Berl., 2 sheets, 1 sub nom. *B. heterophylla* var. *polycephala* Schz. Bip.); *H. Galeotti* 2486, alt. 2,100 meters, Cordillera, State of Oaxaca, 1840 (Del.); *August Ghiesbreght* 112, Plateau of Mexico, 1842–1843 (Del.; Gray); *idem* 380, moist plains of the cold region, September–October (Gray); *Josiah Gregg* 256, Saltillo, Coahuila, July 14, 1848 (Mo.); *C. V. Hartman* 198, ditch, Oputo, Sonora, October 26, 1890 (Kew; Penn.); *idem* 833, San Pedro, Sonora, September 14, 1890 (Gray); *idem* 962, between San Pedro and Fronteras, Sonora, September 20–24, 1890 (Gray); *Carl Heller* 389, meadows, alt. 2,400–2,700 meters, Toluca, State of Mexico (Mus. V.); ex *Horto Chelseae* (Brit., sub. num. 3417); ex *Horto Kewensi*, ann. 1785 (Brit., type material); *Humboldt & Bonpland*, alt. 1,800 meters, temperate places near Morelia (formerly Valladolid), Michoacán (Par.; type of *Bidens arguta* H.B.K.); *iidem*, Morelia (Par.; type of *Bidens decolorata* H.B.K.); *A. F. Jeanjean*, rocks of Massané, Villeneuve, France, October, 1912 (Field); *J. G. Lemmon*, Rucker Valley, Chiricahua Mts., Arizona, September, 1881 (Brit.); *idem* 59, Creek of San Antonio, Tucson, Arizona (Gray); *idem* 2770, Huachuca Mts., Arizona, September, 1882 (Boiss.; Field;

Kew; Petrop.); *idem & uxor* 86, Ajusco Mts., State of Mexico, 1905 (Calif.; Gray); *Lloyd* 408, canyon, Huehuerachi, Sonora, December 10, 1890 (Gray; Kew); *L. Motelay* 585, subspontaneous, Bordeaux, France, November, 1877 (Del.; Par.; U.V.); *idem* 1676, muddy banks of the Garonne River at Bordeaux, France, November 14, 1877 (Boiss.; Kew; Par.); *Frederick Müller* 911, Orizaba, Mexico, September, 1853 (N.Y.); *idem* 1672, eodem loco, August, 1853 (Kew; Petrop.); *E. W. Nelson*, Atlixco, State of Puebla, July 25–August 1, 1893 (U.S.); *idem* 612, alt. 2,310–2,400 meters, west slope of Mt. Zempoaltepec, Oaxaca, July 5–13, 1894 (U.S.); *idem* 754, vicinity of Totontepec, Oaxaca, July 15–20, 1894 (U.S.); *idem* 4853, alt. 2,100–2,250 meters, base of Mt. Mohinora, Chihuahua, August 23–31, 1898 (Gray); *E. J. Neyraut*, slope of right bank of Garonne River, above wharf of the Souys, Bordeaux-Bastide, Dept. Gironde, France, November 19, 1899 (Burn.); *C. R. Orcutt* 3714, Ajusco, State of Mexico, August 20, 1910 (Kew); *idem* 4076, Federal District, October 16, 1910 (Field); *idem* 4125, Telles, Hidalgo, September 21, 1910 (Field); *idem* 4604, State of Colima, October 24, 1910 (Field); *Edward Palmer* 49 and 49½, Alvarez, State of San Luis Potosí, September 5–10, 1902 (Carn.; Field; Mo.; N.Y.); *idem* 269, vicinity of Durango, State of Durango, April–November, 1896 (Berl.; Field; Gray; Kew; Mo.); *idem* 348, vicinity of Saltillo, Coahuila, 1898 (Field; Kew; Mo.); *idem* 365, alt. 2,655 meters, Cumbro, southwestern Chihuahua, October, 1885 (Gray; Kew); *idem* 425, Guadalajara, Jalisco, September, 1886 (Boiss.; Gray; forma prope *B. Ferulaefoliam*); *idem* 487, between San Luis Potosí and Tampico, December, 1878–February, 1879 (Phila.); *idem* 516, vicinity of Mapimi, Durango, October 21–23, 1898 (Calif.; Kew; Mo.); *idem* 516½, vicinity of Torreón, Coahuila, October 13–20, 1898 (Field); *idem* 634, near Parras, Coahuila, June 8–28, 1880 (Boiss.; Gray; Kew; Phila.; U.V.); *idem* 669, vicinity of Durango, State of Durango, September, 1896 (Gray); *idem* 670, eodem loco et tempore (Berl.; Gray; Mo.); *idem* 671, eodem loco et tempore (Berl.; Boiss.; Field; Kew; Mo.); *idem* 676 and 678, eodem loco, April–November, 1896 (Boiss.; Field; Gray); *idem* 679 and 683, eodem loco, September, 1896 (Gray); *idem* 680, eodem loco et tempore (Berl.; Gray; Mo.); *idem* 684, eodem loco, April–November, 1896 (Gray); *idem* 938, eodem loco, November, 1896 (Berl.; Boiss.; Field; Gray; Kew; Mo.); *idem* 939, wet bottoms and fields, eodem loco et tempore (Berl.; Boiss.; Field; Mo.);[1] *idem* 940, rich bottom lands, eodem loco, October, 1896 (Berl.; Boiss.;

[1] An additional sheet of *Palmer* 939 (U.S.) bears material cultivated in greenhouse from the original achenes. The foliage is much dissected.

Field; Kew; Mo., 2 sheets); *idem* 944, rich soil, eodem loco, November, 1896 (Gray); *idem* 1739, Mexico, September 25–October 8, 1891 (Field); *R. Pampanini*, Cozzuolo, Italy, November 4, 1899 (Del., 2 sheets; Webb); *Parry & Palmer* 487, alt. 1,800–2,400 meters, Mexico, 1878 (Boiss.; Gray; Kew; Phila.); *Ove Paulsen*, alt. 1,500 meters, Oak Camp Station, Santa Catalina Mts., Arizona, September 23, 1913 (Cop.); *G. Pellanda*, moist fields and ditches, alt. 10 meters, Valley of Pompeii, Naples (Napoli), Campania, Italy, November 4, 1912 (Field); *idem* (*Fiori & Beguinot Fl. Ital. Exsicc.* No.) 1378, sandy soil, subspontaneous and abundant in fields, ditches, alt. 15 meters, between Valley of Pompeii and Scafati, Prov. Salerno, Campania, November 4, 1908 (Field; Gray; U.V.); *C. G. Pringle*, by streams, Santa Catalina Mts., Arizona, May 9, 1883 (Del.; Field; U.V.); *idem*, eodem loco, May 9, 1884 (U.V.) and June 16, 1884 (Carn.);[1] *idem* 6783, wet places, alt. 2,190 meters, Valley of Mexico, State of Mexico, September 6, 1897 (Berl.; Boiss.; Can.; Carn.; Del.; Field; Kew; Mo.; Mun.; Mus.V.; Phila.; U.V., etc.); *idem* 8749, alt. 2,340 meters, borders of fields, Eslava, State of Mexico, September 17, 1903 (Berl.; Boiss.; Carn.; Cop.; Del.; Field; Kew; Mo.; Mun.; Mus. V.; Phila., etc.); *C. A. Purpus* 1549, fields, Pachuca, Hidalgo, September, 1905 (Calif.; N.Y.); *idem* 3828, wet soil, Río de San Francisco, Puebla, August, 1909 (Berl.; Calif.; Field; Mo.; N.Y.); *J. N. Rose* 2995, west of Bolaños, in the Sierra Madre, Jalisco, September 15–17, 1897 (Gray); *J. T. Rothrock* 705, alt. 1,350 meters, Camp Lowell, southern Arizona, September, 1874 (Field; Gray); *Sallé*, Orizaba, Mexico (Del., 2 sheets; Kew); *Osbert Salvin*, Volcán de Fuego, Guatemala, 1873–1874 (Mus. V.); *Wilhelm Schaffner* 168, marshy meadows near Chapultepec, State of Mexico, August, 1856 (Berl.); *J. G. Schaffner* 384*a*, marshes, etc., Valley of San Luis Potosí, 1880 (Gray; Kew); *idem* 384*b*, eodem loco et tempore (Gray); *Scherzer*, alt. 2,700–3,300 meters, Volcán de Pacaya, Guatemala, August, 1854 (Mus. V.); *C. J. W. Schiede*, near Angangueo, Michoacán, October, 1830 (Berl., 2 sheets); *Alb. Schmitz* 79, Valley of Mexico, State of Mexico (Mus. V.); *idem* 541 p.p., Colzada near Piedad, State of Mexico (Mus. V.); *Eduard & Caecilie Seler* 444, near Chapultepec, State of Mexico, November, 1887 (Berl.); *iidem* 475, near Tlalelolco, Federal District, January, 1888 (Berl.); *Smart* 411, San Pedro River, Arizona, 1867 (U.S.); *L. C. Smith* 304, alt. 1,530 meters, Valley of Oaxaca, Oaxaca, November 14, 1894

[1] Here may be mentioned *Pringle* 758, wet meadows, Sacramento Valley, Chihuahua, September 27, 1886 (Berl., 2 sheets; Del.; Field; Kew; Mo., 2 sheets; Mus. V.; N.Y.; Penn.; Phila.; U.V., etc.). Some of the specimens (e.g., Kew, Mus. V., and Penn.) appear to pass into *Bidens Ferulaefolia*.

(Gray); *idem* 910, alt. 2,100 meters, near Puebla, State of Oaxaca, November 6, 1895 (Gray); *Uhde* 644 and 646, Mexico (Berl.); *Charles Wright* 1233, Sonora, 1851 (Gray); *idem* 1233*bis*, eodem loco (vel in Arizona australi fide A. Grayi Syn. Fl.), 1851–1852 (Kew).[1]

The name *Coreopsis aurea* Ait. has been associated by botanists for more than a century with a plant native to the southeastern United States. The description given by Aiton is rather short: "aurea 2 Coreopsis foliis serratis: radicalibus tripartitis; caulinis trifidis integrisve lanceolato-linearibus. Hemp-leav'd Coreopsis. Nat. of North America. Introd. 1785 by Charles Earl of Tankerville. Fl. August & September. H. (Perennis)." The specimen collected from the type plants in Kew Gardens in 1785 is still extant in good condition in the British Museum of Natural History.[2] This specimen bears a superficial resemblance to the plant of the southeastern United States, *Coreopsis mitis* Michx., and, from the confusion found in literature, appears to have deceived every botanist who had examined it. I misinterpreted it in 1914 (Bot. Gaz. 59: 314. 1915). In 1924, however, having in the meantime determined many hundreds of herbarium specimens of *Bidens heterophylla* Ort., I found immediately on reexamination that Aiton's type was merely a cultivated form of that species. This surprising discovery led to a careful search through the remains of the single flowering, worm-eaten head. Two aristae were extracted. These both were retrorsely barbed. Such aristae are entirely unknown in the species from the southeastern United States, but are typical for *B. heterophylla* Ort.[3] Obviously, the name *aurea*, published by Aiton nine years prior to Ortega's *heterophylla*, and transferred to *Bidens* by me in 1915, must be considered the valid trivial name for this well known species.

As stated in an earlier paper (Bot. Gaz. 76: 157. 1923), the Berlin Herbarium contains several specimens under the name *B. luxurians* Willd. One, from the Kunth Herbarium, was collected at the Berlin Botanical Garden, apparently in 1806[4] or about three years before

[1] A few additional specimens are cited in the text.

[2] There is nothing mysterious about the Aiton material's being in this institution rather than at Kew. The Aiton plant had been carried, without doubt, to Banks or Solander, then got into the Banksian Herbarium, and thus finally found its way, with other Banksian specimens, into the British Museum of Natural History (cf. James Britten, Journ. Bot. 50, Suppl. 3: 15. 1912).

[3] Another specimen was found in the same herbarium and had come from the old Chelsea Garden. It had the number 3417 and a copy of the original description of *Coreopsis aurea* was upon the label. It had the same peculiar aspect as the Aiton type, so much so that it might well have been gathered from the same plant. All its achenial aristae were retrorsely barbed.

[4] The date is given "1806–12," whence I assume that it was December, 1806. There is the possibility, however, that 1806–1812 was intended.

the date of publication of *B. luxurians*. A second one was collected in the same garden but the label bears no date. A third has a label saying merely "ex horto?" A fourth is segregated in the Willdenow Herbarium (No. 15019-1). These all are positively *B. aurea*.

Bidens tetragona (La Llav. & Lex.) DC. was described as being very frequent in moist meadows and in deep excavations in the environs of the City of Mexico. It had a tetragonal stem, lanceolate leaves, eight yellow rays, etc. The "tetragonal stem" excludes the lanceolate-leaved *B. laevis* (L.) B.S.P. of the vicinity of Mexico and limits *B. tetragona* definitely to *B. aurea*.[1]

Bidens Warszewicziana was founded by Regel upon plants which bloomed in the Botanical Garden at Zürich in the years 1848 and 1849, from seed collected by Julius Von Warszewicz in the region of Guatemala. Three specimens in the Boissier Herbarium, from the Geneva Botanical Garden, October, 1855, are *B. aurea*. A specimen (U.V.) from the Botanical Garden of Vienna in 1869, obtained from seed sent from the Botanical Garden at Prague in 1868, is likewise *B. aurea*. Similarly, a specimen from the Leipsic Botanical Garden in 1857 and several others, mainly from the Berlin Botanical Garden (all in Berl.), are without exception *B. aurea*. Regel's description of the species and its varieties shows that he relied largely upon the capricious variations of the foliage for his distinctions and apparently was unaware that these various forms had already been noted long before under the well known but synonymous *B. heterophylla*.

Bidens arguta H.B.K. and *B. decolorata* H.B.K. are merely forms with lanceolate, undivided leaves. *B. longifolia* DC. is likewise a form of this species, having the leaves elongately linear-lanceolate. The variation in foliage is so great as to be very deceptive at times. Thus a single sheet often may be found (e.g., *Pringle* 758, U.V.) with leaves varying from undivided and lanceolate to pinnate or bipinnate and with segments lanceolate, linear or even capillary.

Bidens aurea var. *Wrightii* (Gray) Sherff is a form with especially slender, even linear leaves and by some writers is recognized varietally. It is typified, among the specimens cited, by *Berlandier* 717; *Bourgeau* 502 pro parte (Mun.); *Lemmon*, Rucker Valley, etc.; *idem* 59; *Orcutt* 4604; *Rothrock* 705; *Smart* 411; *C. Wright* 1233 and 1233*bis*.

Specimens of *B. aurea* in Italy are said (Prof. Renato Pampanini, Florentiae, in mense Julio, ann. 1924, coram mihi testatus) to produce fertile achenes seldom, if ever, and to reproduce commonly from a rhizome.

[1] *B. tetragona* (La Llav. & Lex.)DC. is not to be confused with *Kerneria tetragona* Moench, a species which reduces to *Bidens pilosa* var. *radiata* Schz. Bip.

EXPLANATION OF PLATE LXXX

Bidens aurea: a, b, lower and upper portions of flowering specimen, ×0.6; *c–e,* diverse cauline leaves, ×0.6; *f,* exterior involucral bract, ×3; *g,* interior involucral bract, ×3; *h,* ray corolla, ×1.8; *i,* palea, ×3; *j, k,* disc florets, ×3; *l, m,* achenes, ×3.6; *a, b, f–k, m,* from *Pringle* 6783, in Hb. Field; *c,* from *Pringle* 8749, ibid.; *d,* from *Rothrock* 705, ibid.; *e,* from *Palmer* 671, *l,* from *Purpus* 3828, ibid.

101. **Bidens integrifolia** Brandegee, Univ. Calif. Publ. Bot. 4: 279. 1912. Pl. LXXXI.

Herba glaberrima, erecta e radice repente, ± 8 dm. alta; caule inferne subtereti et superne angulato, ramis tetragonis. Folia principalia simplicia basi in petiolum 0.5–3 cm. longum sensim vel subabrupte angustata, petiolo adjecto 9–12 cm. longa et 2–4 cm. lata (Brandegeeus usque ad 5 cm. longa, 2.5 cm. lata dixit inaccurate!), oblongo-ovata vel saepius late oblongo-lanceolata, apice obtusa vel subacuta, hic illic obsolete ciliata, membranacea, margine integra vel raro 1-dentata; summa interdum tripartita, foliolo terminali multo maximo. Capitula terminalia, subcorymbosa, pedunculata pedunculis 5–9 cm. longis, radiata, 23–30-flora. Involucrum basi sparsim hispidum, bracteis exterioribus 7–9, linearibus, acutis, ciliatis, calloso-apiculatis, 4–6 mm. longis; interioribus oblongo-lanceolatis, paulo (saepe circ. dimidio) longioribus. Flores ligulati pauci (circ. 5), parvi, ligula elliptici, apice dentati, 5–7 mm. longi (an vidi maturos?). Achaenia linearia vel lineari-clavata, obcompresso-tetragona, nigra, omnino 8-sulcata, infra glabra, supra sparsim breviterque hispidula, corpore 3.6–5 mm. longa, longe biaristata, aristis flavidulis, retrorsum hamosis, suberectis, 3.5–4 mm. longis.

Type specimen: Collected by *Carl Albert Purpus,* No. 5126, along brooks near Guascama, Minas de San Rafael, San Luis Potosí, Mexico, June, 1911 (Calif.).

Distribution: Known only from type locality, Guascama, Minas de San Rafael, San Luis Potosí, Mexico.

Specimens examined: *Purpus* 5126 (type, Calif.: cotypes, Berl.; Brit.; Field; Gray, 2 sheets; Mo.).

EXPLANATION OF PLATE LXXXI

Bidens integrifolia: a, entire flowering and fruiting specimen, ×0.61; *b,* exterior involucral bract, ×4.87; *c,* interior involucral bract, ×4.87; *d,* ray corolla, ×4.87; *e,* palea, ×4.87; *f,* disc floret, ×4.87; *g,* anthers, ×40; *h,* pollen grain, ×460; *i,* upper portion of pistil, ×40; *j,* achene, ×4.87; all from cotype, in Hb. Field.

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